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THE
Montreal Medical Journal

A MONTHLY RECORD OF THE

PROGRESS OF MEDICAL AND SURGICAL
SCIENCE.

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Original Communications.

THE REPORT OF THE AMERICAN PEDIATRIC SOCIETY'S COLLECTIVE INVESTIGATION INTO THE USE OF ANTITOXIN IN THE TREATMENT OF DIPHTHERIA IN PRIVATE PRACTICE.¹

This subject was chosen by the officers of the Society for its eighth annual meeting, with the belief that a large amount of valuable experience not otherwise available might in this way be reached and collated. It was also believed that a more trustworthy estimate of the value of the serum treatment of diphtheria might thus be obtained than by statistics taken from hospital practice. There are very few hospitals in America that receive diphtheria patients, and the conditions under which patients are admitted to hospitals and the surroundings while there are so different from those of private practice, that the measure of success in hospital cases cannot be taken as an index of the results which have been obtained upon this side of the Atlantic with the new treatment.

In order, therefore, to obtain an expression of opinion from American physicians as to the serum treatment, after what had been, with most of them, their first year's experience, a circular letter was prepared and issued by the Committee early in April. This was distributed through the members of the Society as widely as could be done during the time allowed. An attempt was made to reach as many physicians as possible who had had experience with the remedy.

The first surprise of the Committee was in learning how very widely the serum treatment had been employed, especially in the Eastern and mid-Western states. With more time, the number of cases collected might easily have been doubled and perhaps trebled;

¹ Reported at the Eighth Annual Meeting held at Montreal, Canada, May 26, 1896.

but enough reports have come in to enable one to see what opinion was held on the 1st of May, 1896, by American physicians who have used this remedy.

The circular letter asked for information upon the following points: Age, previous condition, duration of disease when the first injection was made, the number of injections, the extent of the membrane—tonsils, nose, pharynx, and larynx, whether or not the diagnosis was confirmed by culture, complications or sequelæ, viz., pneumonia, nephritis, sepsis, paralysis; the result, and remarks, including other treatment employed, the preparation of antitoxin used, and general impression drawn from the cases.

Reports were returned from 615 different physicians, with 3,628 cases. Of these, 244 cases have been excluded from our statistical tables. These were cases in which the disease was said to have been confined to the tonsils and the diagnosis not confirmed by culture, and therefore open to question. A few cases were reported in such doubtful terms as to leave the diagnosis uncertain. The figures herewith given are therefore made up from cases in which the diagnosis was confirmed by culture (embracing about two-thirds of the whole number) and others giving pretty clear evidence of diphtheria, either in the fact that they had been contracted from other undoubted cases, or where the membrane had invaded other parts besides the tonsils, such as the palate, pharynx, nose, or larynx. It is possible that among the latter we have admitted some streptococcus cases, but the number of such is certainly very small.

There are left, then, of these cases, 3,384 for analysis. These have been observed in the practice of 613 physicians from 114 cities and towns, in fifteen different states, the District of Columbia and the Dominion of Canada.

In the general opinion of the reporters the type of diphtheria during the past year has not differed materially from that seen in previous years, so that it has been average diphtheria which has been treated. If there is any difference in the severity of the cases included in these reports from those of average diphtheria, it is that they embrace a rather larger proportion of very bad cases than are usually brought together in statistics. The cases according to the extent of the membrane, are grouped as follows: In 593 the tonsils alone were involved. In 1397 the tonsils and pharynx, the tonsils and nose, the pharynx and nose, or all three were affected. In 1256 cases the larynx was affected either alone or with the tonsils, pharynx, and nose, one or all. In many instances the statement is made by the reporters that the serum was resorted to only when the condition of the patient had become alarmingly worse under ordinary methods

of treatment. This is shown by the unusually large number of cases in which injections were made late in the disease. Again, many physicians being as yet in some dread of the unfavorable effects of the serum have hesitated to use it in mild cases and have given it only in those which from the onset gave evidence of being of a severe type. The expense of the serum has unquestionably deterred many from employing it in mild cases. These facts, it is believed, will more than outweigh the bias of any antitoxin enthusiasts by including many mild cases which would have recovered under any treatment. It will, however, be remembered that tonsillar cases not confirmed by culture have not been included.

Only two reports embracing a series of over 100 cases have been received, most of the observers having sent in from five to twenty cases, although there are many reports of single cases, particularly of single fatal ones.

In addition to this material which has come in response to the circular, there have been placed at the disposal of the Committee, by the courtesy of Dr. H. M. Biggs, 942 cases treated in their homes in the tenements of New York. Of these, 856 were injected by the corps of inspectors of the New York Health Board, upon the request of the attending physician, and eighty-six others were treated by physicians receiving free antitoxin from the Health Board. In the first group the diagnosis of diphtheria was confirmed by culture in every case, and in all of the latter except twenty-six; in these the diagnosis rested upon extensive membranous deposits or laryngeal invasion. The cases of the New York Health Board were of more than ordinarily severe type, 485, or more than fifty per cent. of these, being reported as being in bad condition at the time of injection; to mild cases the inspectors were not often called. Further, an unusually large number of them (38 per cent.) were injected on or after the fourth day of the disease. In 182 of these cases only the tonsils were affected; in 466 the tonsils with the pharynx or nose, the pharynx and nose, or all three; in 294 the larynx was invaded either with or without disease of the tonsils, nose, or pharynx.

Through the courtesy of Dr. Biggs the Committee is able to include also a partial report upon 1,468 cases from Chicago, treated in their homes in that city by a corps of inspectors of the Health Department. It was the custom in Chicago to send an inspector to every tenement-house case reported, and to administer the serum unless it was refused by the parents. These cases were therefore treated much earlier and the results were correspondingly better than were obtained in New York, although the serum used was the same in both cities, viz., that of the New York Health Board.

THE RESULT AS INFLUENCED BY THE TIME OF INJECTION.

In table I. are given the results obtained in these three different groups of cases, classified according to the day on which they received the first injection of serum antitoxin.

TABLE I.—DAY OF INJECTION AND RESULT.

	INJECTED ON 1ST DAY, ON 2ND DAY, ON 3RD DAY, ON 4TH DAY, ON 5TH DAY.			INJECTED ON 6TH DAY.			DAY OF INJECTION UNKNOWN.			TOTALS.									
	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.							
The Committee's Report.	764	38	4.9/1065	620	70	12.7	336	77	22.9	390	152	38.9	215	15	7.0	3384	450	13.0	
New York Health Board.	125	11	8.7	215	26	12.0	228	37	16.6	203	50	24.0	17	4	23.5	942	169	17.8	
Chicago Health Board.	106	0	0	336	5	1.5	600	18	2.7	269	38	14.1	0	0	0	1408	94	6.4	
Totals.	996	49	4.9/1616	120	7.4	1508	134	8.8	758	147	20.7	600	244	35.3	232	10	5794	713	12.3

The grand total gives 5,794 cases with 713 deaths, or a mortality of 12.3 per cent., including every case returned; but the reports show that 218 cases were moribund at the time of injection or died within

twenty-four hours of the first injection. Should these be excluded there would remain 5,576 cases (in which the serum may be said to have had a chance) with a mortality of 8.8 per cent.

Of the 4,120 cases injected during the first three days there were 303 deaths—a mortality of 7.3 per cent., including every case returned. If from these we deduct the cases which were moribund at the time of injection, or which died within twenty-four hours, we have 4,013 cases, with a mortality of 4.8 per cent. Behring's original claim, that if cases were injected on the first or second day the mortality would not be 5 per cent., is more than substantiated by these figures. The good results obtained in third-day injections were a surprise to your Committee. But after three days have passed the mortality rises rapidly, and does not differ materially from ordinary diphtheria statistics. Our figures emphasize the statement so often made that relatively little benefit is seen from antitoxin after three days; however, it must be said that striking improvement has in some cases been seen even when the serum has been injected as late as the fifth or sixth day. The duration of the disease, therefore, is no contraindication to its use.

THE INFLUENCE OF BACTERIOLOGICAL DIAGNOSIS UPON THE STATISTICS.

This is shown in Table II.

TABLE II.—DIAGNOSIS CONFIRMED BY BACTERIOLOGICAL EXAMINATION.

Committee's Reports	2,453	cases;	302	deaths;	mortality,	12.3	per cent.
N. Y. Board of Health	916	"	160	"	"	16.9	" "
Chicago "	1,468	"	94	"	"	3.4	" "
Totals	4,837	"	556	"	"	11.4	" "
(Excluding 145 cases which were moribund or which died in twenty-four hours).....						8.7	" "

DIAGNOSIS FROM CLINICAL EVIDENCE ONLY.

Committee's Reports	931	cases;	148	deaths;	mortality,	15.9	per cent.
N. Y. Board of Health.....	26	"	9	"	"	34.6	" "
Totals.....	957	"	157	"	"	16.3	" "
(Excluding 72 cases either moribund or dying in twenty-four hours).....						7.6	" "

In the cases in which the diagnosis was not confirmed by a bacteriological examination the mortality is thus 5 per cent. higher than in the bacteriological cases. This difference is to be explained by two facts: first, as already stated, that we have excluded from our reports all tonsillar cases (and hence most of the very mild ones) not confirmed by bacteriological examinations; and secondly, by the fact that this group of cases comprises those treated in the country where physicians have hesitated to use antitoxin unless the type of the disease was a grave one, and where also a large proportion of the injections were made later than in the cities. However, should we leave out the moribund cases, the mortality is but 9.6 per cent., which

differs but slightly from the cases confirmed by bacteriological diagnosis.

In our subsequent statistics we shall consider together all the cases bacteriologically confirmed and otherwise, as the statistics are not materially altered by this grouping.

THE RESULTS AS MODIFIED BY THE AGE OF THE PATIENTS.

Unfortunately the ages have not been furnished in the report of the Chicago cases, and we have therefore only the cases reported to the Committee and those from the New York Board of Health for analysis. In Table III. are shown the mortality of the different ages grouped separately.

TABLE III.—AGE AND RESULTS OF TREATMENT.

	0 to 2 Years.			2 to 5 Years.			5 to 10 Years.			10 to 15 Yrs.			15 to 20 Yrs.			20 Years and Over.		
	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.	Cases.	Deaths.	Mortality per cent.
Committee's Report.	631	137	21.7	1276	175	13.7	883	108	12.2	276	19	6.8	112	4	3.6	214	9	4.2
New York Health Board.	236	65	27.5	466	83	17.8	176	21	11.9	29	0	0	11	0	0	22	0	0
Totals.	867	202	23.3	1742	258	14.7	1061	129	12.1	305	19	6.2	123	4	3.2	236	9	3.8
Moribund.	43			59			59			9			0			4		
Mortality Excluding Moribund Cases.			19.2			13.3			8.7			3.3			3.2			2.1

The highest mortality is seen in all reports to be in the cases under two years, but including all those returned, even those that were moribund when injected, the death rate was but 23.3 per cent. (21.7 per cent. of the Committee's cases), while if we exclude cases moribund when injected or dying within the first twenty-four hours, it falls to 19.2 per cent.

After the second year there is noticed a steady decline in mortality up to adult life. In many of the reports previously published the statement has been made that no striking improvement in results was observed in adult cases treated by the serum. Our figures strongly

contradict this opinion. Of 359 cases over fifteen years old, which were returned, there were but thirteen deaths. That the reader may judge for himself how far antitoxin is to be held responsible for the result, a brief summary of these thirteen cases is appended.

CASE I.—Fifteen years old; injected on the fourth day; membrane covering tonsils and pharynx; profoundly septic, sinking rapidly when injected; died in two hours. "My only death in seventeen cases" (Jones, Gloucester, Mass.).

CASE II.—Forty-four years old; injected on the fourth day; membrane on the tonsils and pharynx; in bad condition; died three hours after injection. The tonsils had been previously incised, the early diagnosis having been quinsy.

CASE III.—Thirty-one years old; injected on the sixth day; membrane on the tonsils, nose, pharynx, and larynx; intubation; sepsis; in bad condition; lived eight hours after injection.

CASE IV.—Thirty-five years old; injected on the fifth day; membrane on the pharynx and nose (?); in bad condition; septic; died in twelve hours.

CASE V.—Sixty years old; in bad condition; had serious mitral regurgitation; injected on the fourth day; membrane covering tonsils, pharynx and larynx; died from heart failure on following day.

CASE VI.—Sixty years old; "kidney trouble for years;" injected on the third day; very extensive membrane, covering tonsils, pharynx and nose; profound sepsis; in bad condition; died suddenly on the day after injection.

CASE VII.—Seventeen years old; in bad condition; convalescing from measles; enormous adenopathy; profound sepsis; exceedingly high temperature; membrane covering tonsils and nose; injected at the end of forty-eight hours; three injections, temporary improvement after each one; duration of life not given.

CASE VIII.—Fifteen years old; in bad condition; injected on the ninth day; membrane covering tonsils, nose, pharynx and larynx; no operation; enormous infiltration of the tissues of the neck; nephritis; sepsis; lived four days and died of sepsis.

CASE IX.—Twenty years old; injected on the third day; membrane upon the tonsils, nose, pharynx, and larynx; "a stubborn patient who got up before he was allowed, and died suddenly after it."

CASE X.—Twenty-five years old; injected on the fifth day; membrane covering both tonsils, entire pharynx, and completely occluding nose; nephritis and sepsis; throat cleared off entirely; died suddenly on the fourteenth day from cardiac paralysis.

CASE XI.—Nineteen years old; injected on the fifth day; mem-

brane upon the tonsils and pharynx; profound sepsis; duration of life unknown.

CASE XII.—Twenty-two years old; injected on the fourth day; membrane on the tonsils and gums; sepsis; died on the sixth day.

CASE XIII.—The well-known Brooklyn case, reported in 1895. Girl, sixteen years old, who died suddenly ten minutes after injection.

Such are the adult cases which antitoxin failed to cure. Four of them were moribund at the time of injection, no one of them living over twelve hours. Two, both sixty years old, were already crippled by previous organic disease, one of the heart, and the other of the kidneys. In the measles case there was undoubted evidence of streptococcus septicæmia. Only two of the cases were injected as early as the third day; three of them on the fifth day; and one on the ninth day. Omitting the four moribund cases the mortality of 355 adult cases treated with the serum is 2.5 per cent.

PARALYSIS.

Reliable data upon this point and those hereafter to be mentioned are to be had only from the 3,384 reports returned to the Committee. Of these paralytic sequelæ appeared in 328 cases, 9.7 per cent. Of the 2,934 cases which recovered, paralysis was present in 276, or 9.4 per cent. Of the 450 cases which died, paralysis was noted in fifty-two, or 11.4 per cent.

The variety of the paralysis and the date of injection is shown in the following table:

TABLE IV.—VARIETY OF PARALYSIS AND THE DAY OF INJECTION.

RECOVERY CASES.	CASES	DAY OF INJECTION.					
		1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	Unknown.
Paralysis mentioned (variety not specified).....	132	8	32	32	19	16	23
Throat only (aphonia, nasal voice or regurgitation).....	114	16	21	25	11	16	24
Extremities.....	14	3	5	2	.....	3	1
Ocular.....	11	.....	4	3	1	2	1
General (multiple neuritis).....	4	.....	1	2	1	.....	.....
Sternoc-mastoid.....	1	.....	1	.....	.....	.....	.....
FATAL CASES.							
Paralysis mentioned (variety not specified).....	9	.....	3	2	1	2	1
*Cardiac, late after throat clear (in 4 of them throat also).....	32	1	2	8	9	8	4
Throat only.....	6	.....	2	.....	.....	.....	4
General late.....	4	.....	1	.....	1	2	.....
Muscles of Respiration.....	1	.....	1	.....	.....	.....	.....
Totals.....	328	28	73	76	43	49	59

* Cases of heart failure occurring at the height of the disease have not been included here; although they are mentioned among the cases of cardiac paralysis in the table of fatal cases.

Observations of some of the individual cases are interesting, particularly those of cardiac paralysis. It is twice stated that the child had gotten up and walked out of the house, where it was found dead. Twice death occurred after sitting up suddenly; once, on jumping from one bed into another. One patient of twenty years got up contrary to orders and died soon afterward. Another patient was apparently well until he indulged in a large quantity of cake and candy, soon after which cardiac symptoms developed, and he died shortly. One case was that of a woman sixty years old, who had serious organic cardiac disease.

It is difficult from these statistics to state what protective power the serum may have over the nerve cells and fibres. Apparently this is not great unless the injections are made early in the disease, and even then in severe cases the amount of damage done to these tissues in twenty-four hours may be very great, even irreparable. Time is not the only element in estimating the effect of the diphtheria toxins.

Great discrepancy exists in the statements made regarding the frequency of paralytic sequelæ after diphtheria. In a series of 1,000 cases reported by Lennox Browne, paralytic sequelæ were present in 14 per cent. In 2,448 cases by Sanné, paralysis was noted in 11 per cent. In the series of cases here reported, the difference is slightly in favor of the antitoxine treatment, but paralysis is certainly frequent enough to show how extremely susceptible the nervous elements are to the diphtheria toxins. One thing is quite striking from a study of these cases, and that is the proportion that have died from late cardiac paralysis. That very many of them would undoubtedly have succumbed earlier in the disease from suffocation (laryngeal cases) or diphtheritic toxæmia, had the serum not been employed, is beyond question. Although the serum is able to rescue even many such desperate cases, it cannot overcome the effects of the toxins upon the cells, which have occurred before it was injected.

SEPSIS.

Sepsis is stated to have been present in 362 of the 3,384 cases or 10.7 per cent. It was present in 145 or 33 per cent. of the fatal cases. Some explanation is necessary for a correct appreciation of these figures. The majority of the reporters, it is plain from their remarks, have not distinguished between diphtheritic toxæmia and streptococcus sepsis. The former is certainly meant in the great majority of the cases. There is a very small proportion in which there is evidence of streptococcus sepsis. The six cases complicating measles, and the five complicating scarlet fever, however, should possibly be included among this list.

NEPHRITIS.

The statements on this point are quite unsatisfactory. The reports state that nephritis was present 350 times, or in 10 per cent. of the cases. On the one hand it must be stated that the diagnosis of nephritis rests in many cases simply upon the presence of albumen in the urine; but, on the other hand, it is true that in a large number of the cases, more than half, no examination of the urine is recorded as having been made, so that it is impossible to state with anything like approximate accuracy, the frequency of nephritis in these cases. Of the 450 fatal cases, the presence of nephritis is mentioned without qualification or explanation in thirty-nine cases; these being usually put down also as septic, dying in the acute stage of the disease. There are fifteen fatal cases, however, in which the renal disease was stated as the cause of death. In no less than nine the nephritis occurred late in the disease, usually during the second or third week. In these fifteen cases the evidence of severe nephritis was conclusive such symptoms being present as dropsy, suppression of urine, with coma or convulsions.

BRONCHO-PNEUMONIA.

Broncho-pneumonia is said to have been present in 193 of the 3,384 cases, or 5.9 per cent., a remarkably small proportion when compared with hospital statistics. Among the patients that recovered, broncho-pneumonia was noted 114 times or in 3.8 per cent.; among the fatal cases seventy-nine times, or in 17.5 per cent., but in only about one-half of these was the pneumonia the cause of death. Of these thirty-seven were laryngeal cases operated upon late, ten were septic cases, and the pulmonary disease was coincident with the height of the diphtheritic process. In seven pneumonia was independent of both the above conditions, occurring late in the disease in all but two.

LARYNGEAL CASES.

Of the 3,384 cases reported to the Committee, the larynx is stated to have been involved in 1,256 cases or 37.5 per cent. This proportion is somewhat higher than is usual, and is partly explained by the fact that several physicians have sent in the reports only of their laryngeal cases. These laryngeal cases occurred in the practice of 379 physicians.

In 691, or a little more than one-half the number, no operation was done, and in this group there were 128 deaths. In forty-eight of them laryngeal obstruction was responsible for the fatal issue, operation being refused by the parents, or no reason for its being neglected having been given. In the eighty remaining fatal cases the patients died of other complications, and not from the laryngeal disease.

In the 563 cases, therefore, or 16.9 per cent. of the whole number, there was clinical evidence that the larynx was involved, and yet recovery took place without operation. In many of these cases the symptoms of stenosis were severe, and yet disappeared after injection without intubation. No one feature of the cases of diphtheria treated by antitoxin has excited more surprise among the physicians who have reported them, than the prompt arrest, by the timely administration of the serum, of membrane which was rapidly spreading downwards below the larynx. Such expressions abound in the reports as "wonderful," "marvelous," "prepared to do intubation, but at my next visit the patient was so much better it was unnecessary," "in all my experience with diphtheria have never seen anything like it before," "no unprejudiced mind could see such effects and not be convinced of the value of the serum," etc., etc.

In establishing the value of the serum, nothing has been so convincing as the ability of antitoxin, properly administered, to check the rapid spreading of membrane downward in the respiratory tract, as is attested by the observations of more than 350 physicians who have sent in reports.

Turning now to the operative cases we find the same remarkable effects of the antitoxin noticeable. Operations were done in 565 cases, or in 16.7 per cent. of the entire number reported. Intubation was performed 533 times with 138 deaths, or a mortality of 25.9 per cent. In the above are included nine cases in which a secondary tracheotomy was done, with seven deaths. In thirty-two tracheotomy only was done with twelve deaths, a mortality of 37.4 per cent. Of the 565 operative cases, sixty-six were either moribund at the time of operation, or died within twenty-four hours after injection. Should these be deducted, there remain 499 cases operated upon by intubation or tracheotomy, with 84 deaths, a mortality of 16.9 per cent.

Of the 2,819 cases not operated upon, there were 312 deaths, a mortality of 11.3 per cent. Deducting the moribund cases, or those dying within twenty-four hours after injection, the total majority of all non-operative cases was 9.12 per cent.

Let us compare the results of intubation in cases in which the serum was used, with those obtained with this operation before the serum was introduced. Of 5,546 intubation cases in the practice of 242 physicians, collected by McNaughton and Maddren (1892) the mortality was 69.5 per cent. Since that time statistics have improved materially by the general use (in and about New York, at least) of calomel fumigations. With this addition, the best results published (those of Brown) showed in 279 cases a mortality of 51.6 per cent.

Let us put beside the cases of McNaughton and Maddren the 533 intubations with antitoxin, with 25.9 per cent. mortality. With Brown's personal cases let us compare those of the fourteen observers who have reported to the Committee ten or more intubation operations in cases injected with serum. These comprise 280 cases with sixty-five deaths, a mortality of 23.2 per cent. In both comparisons the mortality without the serum is more than twice as great as in the cases in which serum was used.

The reports of some individual observers concerning intubation with the serum are interesting:

Neff, New York: twenty-seven operations, with twenty-seven recoveries.

Rosenthal, Philadelphia: eighteen operations, with sixteen recoveries.

Booker, Baltimore: seventeen operations, with seventeen recoveries, including one aged ten months, and one seven and a half-months.

Seward, New York: eight operations with eight recoveries.

McNaughton, Brooklyn: "In my last seventy-two operations without serum, mortality 66.6 per cent.; in my first seventy-two operations with serum, mortality 33.3 per cent."

O'Dwyer, New York: "In my last 100 intubations, first seventy, without serum, mortality 73 per cent.; last thirty, with serum, mortality 33.3 per cent."

But even these figures do not adequately express the benefit of antitoxin in laryngeal cases. Witness the fact that over one-half the laryngeal cases did not require operation at all. Formerly 10 per cent. of recoveries was the record for laryngeal cases not operated upon. Surely, if it does nothing else the serum saves at least double the number of cases of laryngeal diphtheria that has been saved by any other method of treatment.

The great preponderance of intubation over tracheotomy operations shows how much more highly the profession in this country esteems the former operation.

A STUDY OF THE FATAL CASES.

Of the 450 fatal cases in the Committee's Report, 229, or one-half, received their first injection of the serum on or after the fourth day of the disease, and 152, or over one-third of these, on or after the fifth day.

There were fifty-eight cases in which it was stated that the child was moribund at the time of injection, the serum being administered without the slightest expectation of benefit, but at the earnest solicitation of the parents.

There remain 350 cases in which the cause of death could be pretty accurately determined by the reports. These died from the following causes, the most important cause being placed first:

Sepsis (including diphtheritic toxæmia) was the cause of death in 105 cases; of which sixteen had nephritis, four were intubated or tracheotomized, two were laryngeal cases not operated upon, four had paralysis, one had pneumonia, and in one the fatal sepsis was attributed to a traumatic condition of the left knee.

Cardiac paralysis was the cause of death in fifty-three cases. Under this head are included cases of sudden heart failure occurring at the height of the disease (twenty-one in number) as well as those more commonly designated as heart paralysis, where death occurred suddenly after the throat cleared off. Of the latter there were thirty-two examples; four of these cases had throat paralysis, nineteen were septic, eight had nephritis, five were intubated, and one tracheotomized.

Broncho-pneumonia was put down as the cause of death in fifty-four cases. In thirty-seven of these it followed laryngeal diphtheria; of these twenty-two were intubated, and four tracheotomized; two had nephritis; nine were septic. Broncho-pneumonia and sepsis was the cause of death in ten cases, of which three had nephritis and one general paralysis. Broncho-pneumonia caused death in seven cases, apart from sepsis or laryngeal diphtheria; of these only one had nephritis; one died from heart failure; and in five pneumonia came on late in the disease.

Laryngeal diphtheria without operation caused death in forty-eight cases. In some of these the operation was refused by the parents, in others it was neglected by the physician, the patients dying of asphyxia; three of these cases had nephritis, four were septic, two had pneumonia, and one had sepsis and nephritis.

Diphtheritic tracheitis or bronchitis caused death in eleven cases; all of these were intubated, and in two there was evidence of the existence of membrane in the bronchi before operation. There were thirty-three other cases in which death followed laryngeal diphtheria without the supervention of pneumonia. It is highly probable that in some of these death was due to membranous tracheitis or bronchitis. All of them were operated upon; ten were septic, two had paralysis, and one had nephritis.

Sudden obstruction of the intubation tube was the cause of death in three other laryngeal cases.

The tube was coughed up in three cases, fatal asphyxia occurring before the physician could be summoned.

Died on the table during tracheotomy, one case.

Nephritis was the cause of death in fifteen cases; seven of these were septic, and three had been intubated.

General paralysis was the cause of death in five cases; in all probably the pneumogastric was involved.

Paralysis of the respiratory muscles produced death in one case, one of laryngeal diphtheria, which was intubated, and was complicated by broncho-pneumonia.

Measles associated with diphtheria produced death in six cases; five of these were laryngeal and were intubated; in two there was pneumonia, and in two sepsis. Diphtheria developed during the height of the measles, or immediately followed it.

Scarlet fever with diphtheria was the cause of death in six cases; in three of these there was broncho-pneumonia, nephritis and sepsis; in two scarlet fever preceded diphtheria, and in one of these there was sepsis with gangrene of the tonsils. In the sixth case the patient died of scarlet fever, which developed during convalescence from the diphtheria.

Gangrene of the cervical glands or cellular tissue of the neck was the cause of death in two cases associated with profound general sepsis.

Endocarditis caused death in one case, nineteen days after the diphtheria.

Diphtheritic inflammation of the tracheal wound with sepsis caused death in one case.

General tuberculosis, five weeks after diphtheria, was assigned as the cause of death in one case.

Exhaustion was the cause of death in three cases, one a protracted case; another complicated by pneumonia and sepsis; one by nephritis.

Convulsions was the cause of death in three cases apart from disease of the kidneys. In one, the well-known Brooklyn case, the girl died ten minutes after the injection, in another twenty-four hours after injection, in the third the particulars were not given.

Meningitis was assigned as the cause of death in one case.

THE KIND OF ANTITOXIN USED.

They are given in the order of frequency with which they have been used. First, the serum prepared by the New York Board of Health; second, Behring's; third, Gibier's; fourth, Mulford's; fifth, Aronson's; sixth, Roux's. In addition a large number of cases

¹ It is worthy of note that in the tests made by the State Board of Health of Massachusetts, published under date of April 6, 1896, this serum was found far below the standard as labelled upon the bottle; thus a package marked to contain 2,500 units, by test was found to contain less than 700. All the other varieties of serum tested were found essentially up to the standard.

are reported as having been treated by the serum prepared by the Health Boards of different cities—Brooklyn, Newark, Rochester, Pittsburgh, etc. The largest number of cases have been treated by the serum prepared by the New York Health Board, a very large number by Behring's serum, all others being relatively in small numbers.

Dosage and number of injections. In the great majority of cases but one injection is reported. In very severe ones two and three have been given. The largest amount is in a case by Weimer (Chicago) who gave eighteen injections of Behring's serum to a laryngeal case in a child thirteen years old. Another instance of ten injections is reported with no unfavorable symptoms.

As a rule the dosage has been smaller in antitoxin units than is now considered advisable, particularly in many of the laryngeal cases and others injected later than the second day.

CASES INJECTED REASONABLY EARLY (DURING THE FIRST THREE DAYS)
IN WHICH ANTITOXIN IS SAID TO HAVE PRODUCED NO
EFFECT, THE DISEASE ENDING FATALLY.

These cases are twenty in number. Brief reports are introduced that the reader may judge to what degree they may be regarded as a test of the serum treatment. In our statistical tables all of them have been included among the fatal cases.

In Cases I. and II. the cultures were reported negative. Case I., by Gallagher, New York: Child, eighteen months old; septic; although no eruption was present, the reporter was "inclined on reflection to regard this case as one of scarlatinal sore throat."

Case II., by Potter, Buffalo: Male, fourteen months old; two cultures made, but no Löffler bacilli found; membrane in the nose and pharynx. Injected on the third day, one dose of Behring's serum No. 1. No improvement; death from sepsis. "Probably pseudo-diphtheria" (I. H. P.).

In Cases III. to IX. no cultures were made.

Case III., by Tefft, New Rochelle: Seven years old; injected after eighteen hours' illness; two injections of Behring's No. 2 serum; membrane on the tonsils, pharynx and nose; no effect observed from injections; patient dying on the third day.

Case IV., by Tefft: Male, four years old; membrane on the tonsils and pharynx; injected after thirty-six hours' illness with Behring's No. 2; died on the third day; no noticeable effect from the injection.

Case V., by Tefft: Six years old; membrane on the tonsils, nose, and pharynx; septic; injected after thirty-six hours' illness; three

injections of Behring's No. 2. "Saw no effect from the injections the disease going steadily on to a fatal termination."

Case VI., by Cameron, Montreal: Two and a half years old; fifty hours ill; membrane on the tonsils, nose and pharynx; septic; no improvement noticed, and child died twenty hours after injection.

Case VII., by Baker, Newtonville, Mass.: Three years old; laryngeal diphtheria; injected on the third day 10 c.c. Roux's serum; cyanosis; intubation; temperature 103° F., and continued high until death in eighteen hours after operation; injections had no effect.

Case VIII., by Anderson, New York: Three years old; injected after three hours' illness; membrane on the tonsils, nose and pharynx; one injection New York Health Board antitoxin. "A case of inalignant diphtheria, full duration twenty-four hours."

Case IX., by McLain, Washington: Four years old; twelve hours sick; membrane on the pharynx and larynx; two injections; no operation; first injection early in the morning, the other early in the afternoon; died the same day; no change in the condition; antitoxin had no apparent effect.

In Cases X. to XIII. diphtheria complicated measles, all reported by W. T. Alexander, New York. Disease confined to the larynx in all; in three the stenosis developed during measles, and in one while the patient was convalescing from measles; diagnosis confirmed by culture in every case, and in all intubation performed. Antitoxin seemed to have no effect, the cases going on to a fatal termination; all received their injections within twenty-four hours after the laryngeal symptoms appeared.

In three cases—XIV. to XVI.—the type of the disease was malignant from the outset.

Case XIV., by Lloyd, Philadelphia: Fifteen months old; injected after thirty-six hours' illness; diagnosis confirmed by culture; membrane covered the tonsils, pharynx, nose, and larynx; intubation; sepsis; death on the fifth day. Although antitoxin was used as promptly as possible no perceptible effect noticed. One injection, Behring's No. 3, was given.

Case XV., by Wert, Mount Vernon, N.Y.: Eighteen months old; injected on the third day; diagnosis confirmed by culture; membrane on the tonsils and pharynx. "Very intense type of the disease." Antitoxin could not be procured before the third day; Gibier's serum used. "Died suddenly in apparent convulsions about ten hours after injection; urine not examined; very little passed."

Case XVI., by Ingraham: Six years old; membrane covered the tonsils, pharynx, and larynx; diagnosis confirmed by culture; pneu-

monia present; condition very bad; injected after two and a half days' illness; three injections of Behring's serum: no benefit noticed.

Case XVII., by Johnson, Buffalo: Three years old; twelve hours ill; case septic from the start; membrane on the tonsils, pharynx, and larynx; diagnosis confirmed by culture. "Antitoxin. apparently had very little effect."

Case XVIII., by Baker, Newtonville, Mass.: Two and a half years old; twenty hours ill; disease confined to larynx; diagnosis confirmed by culture; one injection of Gibier's serum; intubation. "Was doing well a few minutes before death when child got up in its crib, changed color and died almost immediately." Death attributed to "sudden heart failure; found no obstruction of the tube."

Case XIX., by Story, Washington: Five years old; in fair condition; thirty-six hours ill; diagnosis confirmed by culture; membrane on the tonsils, pharynx, and larynx; one injection of United States Marine Hospital antitoxin; injection produced no effect.

CASES IN WHICH UNFAVORABLE SYMPTOMS WERE, MIGHT HAVE BEEN,

OR WERE BELIEVED TO HAVE BEEN, DUE TO

ANTITOXIN INJECTIONS.

Only three cases reported to the Committee could by any possibility be placed in this category. All of the details furnished by the reporters are reproduced:

Case I., by Kortright, Brooklyn: Sudden death in convulsions ten minutes after injection. This case is the already well known Valentine case, occurring in Brooklyn in the spring of 1895. The principal points were as follows: A girl sixteen years old; in good condition; tonsillar diphtheria; diagnosis confirmed by culture; injected on the first day with 10 c.c. Behring's serum; died in convulsions ten minutes later.

Case II., by Kerley, New York: Fairly healthy boy, two and one half years old; membrane on tonsils, pharynx, and in nose. Diagnosis confirmed by culture; injected on the morning of the fourth day with 10 c.c., (1000 units) New York Health Board serum; temperature at time of injection 100.4° F.; no sepsis, and child apparently not very sick; urine free from albumen. Distinctly worse after injection; in ten hours temperature rose to 103° F.; urine albuminous; throat cleared off rapidly, but marked prostration and great anæmia, with irregular fluctuating temperature continued and death from exhaustion with heart failure four days after the use of the serum.

Case III., by Eynon, New York: Male, three and one half years old; diagnosis confirmed by culture; two days ill; membrane on ton-

sils and in nose; two injections New York Health Board serum. "A rapid nephritis developed after the second injection causing coma, convulsions and death twenty hours after the second injection." In response to an inquiry for further particulars the following was received: "The case seemed a mild one, but the injection was given one afternoon and repeated the following afternoon, about 1,500 units in all. The urine up to that time had not been examined. About fourteen or sixteen hours after the second injection unfavorable symptoms began to develop pointing to infection of the kidneys. The urine was found to be loaded with albumen. My impression at the time was that the antitoxin either produced, hastened or intensified nephritis, thereby causing the fatal termination."

In regard to the three fatal cases just cited, Case I. is wholly unexplained. In Case II., the query arises, did this sudden change hinge upon the injection of the serum, or was it one of those unexplained abrupt changes for the worse in a case apparently progressing favorably, so often observed in diphtheria? As regards Case III., it will be seen from the letter that the evidence is not at all conclusive. All details available are given, and the reader may draw his own conclusions.

CLINICAL COMMENTS.

The following are selected from hundreds which have been received, and may be taken fairly to represent the sentiments of physicians who have sent in reports:

Dr. Douglas H. Stewart, New York, sends reports of 4 cases, all desperate ones, and all "presumably fatal under any other form of treatment." Very extensive membrane in all; larynx involved in 3; in one neglected case in a child three years old, *injected upon the fifth day*, the membrane covered the tonsils, nose, pharynx, and larynx. Broncho-pneumonia, nephritis and sepsis all present. Temperature 107° F. at the time of the first injection. Prostration so great that he dared not attempt intubation. Believes that this case would certainly have been fatal in a few hours without antitoxin. Perfect recovery.

In another case three years old, membrane first discovered in the left ear, next morning seen upon the tonsils, and spread in a few hours over the pharynx into the larynx and trachea. Intubation necessary in a few hours; had never seen membrane spread so rapidly as in this child. Urine albuminous; membrane subsequently expelled from larynx and trachea in large casts, with profuse bloody expectoration. Complete recovery on the ninth day. The physician describes this as "the very worst case of diphtheria that has ever come under my

notice." Five thousand four hundred antitoxin units were given in four injections. He remarks: "My experiences in the past have been so very unfortunate that the advocates of antiseptics or therapeutics were a constant surprise to me. It has been my fate to have the most desperate cases unloaded upon my shoulders. I had been forced into the belief that the profession was absolutely powerless in the presence of true diphtheria; have lost case after case with tube in the larynx and calomel fumigations at work. Previous to antitoxin my only hope had become centered in nature and stimulants. In two years have not lost a single case, and surely I may be pardoned if I suffer from diphtheria-phobia in a sub-acute form, and use antitoxin sometimes unnecessarily."

Dr. L. L. Danforth, New York, states that during his twenty-two years of practice in New York he has seen many fatal cases of diphtheria, had used all kinds of remedies, mainly those of the homeopathic school, and while he had as much confidence in the latter as in anything else, he had seen so many deaths during the year past that he "hailed with delight the advent of antitoxin, and determined to use it." Reports five cases, all of a severe type. "The result in every case has been marvelous. I would not dare to treat a case now without antitoxin."

Dr. H. W. Berg, New York, reporting fourteen cases, says: "I have not yet ceased to be surprised at the recovery of some of these cases, which, in the light of my former experience with diphtheria treated without antitoxin, seemed to be irretrievably lost."

Dr. George McNaughton, Brooklyn, reports seventy-two laryngeal cases, with twenty-four deaths; sixty-seven of these were intubated, with twenty-one deaths. He states that he has kept no record of cases other than laryngeal ones, as these seemed the best test of the serum treatment. He believes that if the serum is used early, very many cases will not need operation for the relief of stenosis. "I would urge the use of antitoxin in all cases of croup in any patient who has an exudation upon the pharynx; would not wait for bacteriological confirmation of diagnosis, for in so doing valuable time is lost." Has noticed that the tube is coughed up more frequently in injected cases, and believed this due to the fact that the swelling of the tissues subsides at an early date.

Dr. D. C. Moriarta, Saratoga, reporting four cases, says that the first was a malignant one and "I only used the remedy because I am Health Officer and was urged to do so, as the type of the disease was that form from which I have seen recovery but once in eleven years." Boy five years old, four days ill when injected; great prostration,

rapid breathing, and he was "practically gone." Nares filled and tonsils and pharynx covered; severe nasal hemorrhage; cervical glands greatly swollen; heart's action very frequent and feeble; child unable to lie down. Behring's serum twenty c.c. injected; in six hours evidently more comfortable; in eighteen hours decidedly improved; in twenty-four hours sitting up and feeling much better; in forty-eight hours all urgent symptoms gone and membrane loosening. Subsequently had nephritis which lasted six weeks, and multiple neuritis which persisted for three months, but ultimately recovered perfectly. "I send this report because it converted me. No unbiased person familiar with diphtheria could see such results as this and not feel there must be good in it."

Dr. F. M. Crandall, New York, sends report of a child seven years old. Membrane on the tonsils and in larynx, with croup for forty hours when antitoxin was injected and intubation done. Progress of the disease had been rapid; semi-stupor and eyes half-open; very feeble and rapid pulse; intense toxæmia; general cyanosis. Both cyanosis and dyspnoea persisted after intubation, showing clearly the presence of membrane below the tube. Case regarded as "absolutely hopeless." The first change was seen in the disappearance of toxæmia, with improvement in the pulse, clearness of the mind, etc.; later a change in the local condition; large masses of membrane were expelled from the larynx and trachea, necessitating frequent removals of the tube. Tube finally removed in a week with complete recovery.

Dr. Reynolds, Baltimore, mentions a case showing the danger of relying too implicitly upon the bacteriological diagnosis. Male, three years. Culture reported only staphylococcus and streptococcus, consequently injection delayed until the fifth day, when membrane covered tonsils, nose, and pharynx. Child died two days later. A sister subsequently contracted the disease, received antitoxin on the third day and recovered. The reporter would not wholly rely upon the culture test for diagnosis.

SUMMARY.

(1) The report includes returns from 615 physicians. Of this number more than 600 have pronounced themselves as strongly in favor of the serum treatment, the great majority being enthusiastic in its advocacy.

(2) The cases included have been drawn from localities widely separated from each other, so that any peculiarity of local conditions to which might be ascribed the favorable reports must be excluded.

(3) The report includes the record of every case returned except those in which the evidence of diphtheria was clearly questionable.

It will be noted that doubtful cases which recovered have been excluded, while doubtful cases which were fatal have been included.

(4) No new cases of sudden death immediately after injection have been returned.

(5) The number of cases injected reasonably early in which the serum appeared not to influence the progress of the disease was but nineteen, these being made up of nine cases of somewhat doubtful diagnosis; four cases of diphtheria complicating measles, and three malignant cases in which the progress was so rapid that the cases had passed beyond any reasonable prospect of recovery before the serum was used. In two of these the serum was of uncertain strength and of doubtful value.

(6) The number of cases in which the patients appeared to have been made worse by serum were three, and among these there is only one new case in which the result may fairly be attributed to the injection.

(7) The general mortality in the 5,794 cases reported was 12.3 per cent.; excluding the cases moribund at the time of injection or dying within twenty-four hours, it was 8.8 per cent.

(8) The most striking improvement was seen in the cases injected during the first three days. Of 4,120 such cases the mortality was 7.3 per cent.; excluding cases moribund at the time of injection or dying within twenty-four hours, it was 4.8 per cent.

(9) The mortality of 1,448 cases injected on or after the fourth day was 27 per cent.

(10) The most convincing argument, and to the minds of the Committee an absolutely unanswerable one, in favour of serum therapy is found in the results obtained in the 1,256 laryngeal cases (membranous croup). In one-half of these recovery took place without operation, in a large proportion of which the stenosis was severe. Of the 533 cases in which intubation was performed the mortality was 25.9 per cent., or less than half as great as has ever been reported by any other method of treatment.

(11) The proportion of cases of broncho-pneumonia—5.9 per cent.—is very small and in striking contrast to results published from hospital sources.

(12) As against the two or three instances in which the serum is believed to have acted unfavourably upon the heart might be cited a large number in which there was a distinct improvement in the heart's action after the serum was injected.

(13) There is very little, if any, evidence to show that nephritis was caused in any case by the injection of serum. The number of

cases of genuine nephritis is remarkably small, the deaths from that source numbering but fifteen.

(14) The effect of the serum on the nervous system is less marked than upon any other part of the body; paralytic sequelæ being recorded in 9.7 per cent. of the cases, the reports going to show that the protection afforded by the serum is not great unless injections are made very early.

The Committee feels that this has been such a responsible task that it has thought best to state the principle which has guided it in making up the returns. While it has endeavoured to present the favourable results with judicial fairness, it has also tried to give equal or even greater prominence to cases unfavourable to antitoxin.

In conclusion the Committee desires in behalf of the Society to express its thanks to members of the profession who have co-operated so actively in this investigation, and to Dr. A. R. Guerard for the preparation of the statistical tables.

(Signed)	L. EMMET HOLT, M.D., W. P. NORTHRUP, M.D., JOSEPH O'DWYER, M.D., SAMUEL S. ADAMS, M.D.,	}	Committee.
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THE ACTION OF THE SOCIETY UPON THE REPORT.

At the close of its presentation, the Society voted to accept the report of the Committee, and after a full discussion it was decided to embody its conclusions in the following resolutions:

(1) *Dosage.* For a child over two years old the dosage of antitoxin should be in all laryngeal cases with stenosis, and in all other severe cases, 1500 to 2000 units for the first injection, to be repeated in from eighteen to twenty-four hours if there is no improvement; a third dose after a similar interval if necessary. For severe cases in children under two years, and for mild cases over that age, the initial dose should be 1000 units, to be repeated as above if necessary; a second dose is not usually required. The dosage should always be estimated in antitoxin units and not of the amount of serum.

(2) *Quality of Antitoxin.* The most concentrated strength of an absolutely reliable preparation.

(3) *Time of Administration.* Antitoxin should be administered as early as possible on a clinical diagnosis, not waiting for a bacteriological culture. However late the first observation is made, an injection should be given unless the progress of the case is favourable and satisfactory.

The Committee was appointed to continue its work for another year and was requested to issue another circular asking for the further co-operation of the profession, this circular to be sent out as soon as possible in order that physicians may record their cases as they occur through the coming year.

UPON ARRESTED OR REPAIRED DISSECTING ANEURYSMS;¹

(Continued.)

BY

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It will be well to summarise the leading features of these two cases, with especial reference to the existence in them of the condition of dissecting aneurysm.

CASE I. *Male, æt. 45. Duration of condition nearly a year. Sudden onset with dyspnea and sense of oppression in the chest. Condition complicated with cardiac weakness, puerocysms of an anginoid character, arterio-sclerosis, interstitial nephritis and hydrothorax. Great tenderness over the abdomen, more especially over the epigastrium and left hypochondrium. Attacks of intense pain in the upper portion of the abdomen, affecting also the back, opposite the level of the epigastrium. Sudden death during an attack of "retching."*

Arterial conditions found post-mortem: Nodose arterio-sclerosis of the hyaline-fibroid type. Primary rupture of the inner coats of the termination of the thoracic aorta, 3.25 cm. above the cardiac axis. Dissection between the layers of the media upwards as far as the middle of the arch of the aorta, downwards to the right external and internal iliacs and to the first portion of the left femoral, and laterally along the right renal, with re-entrance into the right external iliac and left femoral. The sac above the primary rupture almost filled with organising clot, and below having smooth walls lined by endothelium. Rupture of several of the lumbar arteries and of the inferior mesenteric at their origins, with secondary passage of these vessels from the sac.

CASE II. *Female, æt. 43. Duration of condition apparently 10 weeks, following upon long continued dyspepsia, palpitations and loss of flesh, and complicated by development of aneurysm of the superior mesenteric artery. Aching pain across the abdomen growing progressively worse, with vomiting and great tenderness on pressure. Pain also across the back. Sudden death from rupture of the aneurysm of the superior mesenteric artery.*

¹ Read before the Montreal Medico-Chirurgical Society, April 3rd, 1896.

Arterial conditions found post-mortem: Root of aorta somewhat dilated; nodose arterio-sclerosis of a "gelatinous" character. Healed aneurysm (filled with laminated clot) of right subclavian artery. Sacculated aneurysm of abdominal aorta. False aneurysm (with intraperitoneal rupture) of superior mesenteric. Primary rupture of the inner coats of the termination of the thoracic aorta 3 cm. above the celiac axis. Dissection between the layers of the media upwards as far as the level of the bifurcation of the trachea with termination in a blind pouch, downwards for 4 cm., ending bluntly. Walls of the sac smooth in neighbourhood of primary rupture, somewhat roughened elsewhere. No re-entrance or secondary communications between aorta and sac.

These two cases present, therefore, what Peacock termed the "advanced stage" of dissecting aneurysm, or what Boström has more recently described as "healed" dissecting aneurysm (ausgeheilte aneurysma). Neither term is, I think, quite satisfactory, for the expression "advanced" conveys the idea of a more extreme condition, while "healed" implies a filling up or obliteration of the aneurysmal sac. What is wanted is a term which shall express the fact that in this class of cases the process of dissection has not directly caused death—and as I have already stated the term "arrested" appears best adapted to convey this meaning.

In studying the literature of the subject, the rarity of the arrested or "healed" cases is very noticeable. Peacock, in 1863, was only able to record 7 out of a total of 80 of all varieties of the condition. Boström, in 1888, gave a list of 17 (which included only 4 of the chronic cases referred to by Peacock, though why the other 3 were omitted, it is difficult to understand.) These 17 were collected out of 177 cases of all forms. By a fuller study, more especially of the English and American literature, and the addition of the rare cases that have been recorded since 1888, I am able, with the addition of the two cases here recorded, to increase the number to 39, or including those cases in which, despite imperfect history and description, there is reason to believe that the author's had before them examples of this condition, to 35. For brevity and convenience of reference I have drawn up the main details of these cases in the form of a table. In this table I have included all cases I have been able to discover in which death did not supervene until a month or more after the primary rupture, or in which failing definite information as to the onset of the condition, the walls of the sac had so far undergone repair that they are described as having a smooth or glistening appearance (and consequently had become possessed of a lining endothelium). In

the tables the asterisk following the names of the observers indicates that the original authority has been consulted by me. For those cases which have no asterisk I am, I believe, without exception, indebted to Boström.

An analysis of the table reveals some points of not a little value.

In the first place, with reference to sex, it is seen that of the 30 cases, 16 occurred in the male and 13 in the female sex, (while one remains unknown) or to all intents and purposes there is an equal incidence of the condition in the two sexes. This is an incidence widely different from what obtains for aneurysms in general, and is an indication that of aneurysms in general among females, the cases of chronic dissecting aneurysms are relatively more frequent than the other forms. Why this should be the case I shall discuss more fully after analyzing other facts revealed by this table. With reference to age incidence, the following is the analysis of the cases in which the ages were stated :

Under 35.....	0
Between 35 and 40.....	4
" 45 " 55.....	7
" 55 " 65.....	5
" 45 " 75.....	4
" 75 " 85.....	2
Over 85.....	2
Total.....	24

The addition of the cases in which the age could only be guessed at does not appear to alter the value of this table in any way. One case is recorded as being from a patient between 30 and 40, another as occurring after childbirth, four in individuals of middle age. There is no clear evidence of any case occurring under the age of 36 years. A slightly greater number occur between 45 and 55 than at any other life period, and beyond this the number per decennium steadily diminishes. I am not fully versed in mortality tables, but think that from these figures it is safe to conclude not that the incidence of this condition is most frequent between 45 and 55, but that from 35 onwards, taking into account the proportion of individuals that reach the successive age periods, there is a progressive increase in (remote) liability to this condition.

One fact, however, stands out very clearly, that the condition is not developed in youth or early adult life, and that thus contrary to Boström's contention, made curiously enough with a similar though smaller table of cases before him (*loc. cit.*, p. 69), there is an ætiological relationship between age and incidence. It is clear, therefore, that for the production of the condition there must be a factor present which is not in evidence in the earlier years of life. Mere trauma,

upon which Boström relies, is as liable to be in action before 35 as after that age, and while I am inclined to believe that some direct blow or sudden strain is in every case the direct cause of the development of the condition, I cannot but conclude that such trauma is only effective when there is already some departure of the state of the arterial coats from the perfectly healthy condition.

This departure, I quite agree with Boström, is not the development of an extensive atheroma. Reading the descriptions of the cases here collected it is very remarkable how in case after case attention is called to the slight extent of arterio-sclerosis present and the rarity of calcareous plaques. Indeed it is a matter of common observation that atheromatous ulcers are as common as dissecting aneurysms are rare. We see frequently extensive breaking down of atheromatous plaques and the development of ulcers with partially undermined walls, but these appear never to lead to dissection of the coats by the blood.

But the calcareous atheroma is only one stage and that an advanced stage of the arterio-sclerotic process. There are other stages, or more truly, varieties. In the two cases brought forward by me I have been not a little impressed by the fact that while there was in each a nodose arterio-sclerosis, the plaques, despite their size, showed little evidence of calcification, but were of the hyaline fibroid type, or as Dr. Finley described it in his post-mortem report on the second case, were "gelatinous." And looking through the records of the other cases I find that this same condition has been not unfrequently noted. The analysis is as follows: Out of twenty-two descriptions in which mention is made of the condition of the aorta there is not a single case in which the aorta did not show some disease, only three in which there is stated to have been advanced atheroma. These three are those of Pennock (1st case), [a woman of 75 years of age with "numerous ossific deposits."]; Pennock (2nd case), [a woman verging upon her century. Here the intima was thickly studded with "cartilaginous" deposits], and Symes, in which it is stated that the aorta was very much diseased. Save in the first of these it is difficult to comprehend with certainty the form of arterio-sclerosis present. The other two may or may not have presented the condition seen in my two cases, in which there was extensive nodose arterio-sclerosis, with singularly little evidence of steatomatous or calcareous degeneration. In three further cases (Peacock, Laennec, Fagge) it is simply stated that the aorta was atheromatous, in another (Boström's 3rd case) a few calcareous plaques were present, the aortic intima being smooth in its first portion where the primary rupture occurred, extensively

sclerosed below. Finny speaks of moderate atheroma with but few calcareous patches; Lathan and Swaine, of patches of degeneration in various places up to cartilaginous hardness. The remaining nine cases all presented slight arterio-sclerotic changes.

The impression is certainly left that this condition of chronic dissecting aneurysm is throughout associated with some arterio-sclerosis, but that it rarely is associated with advanced degenerative arterio-sclerosis, or with that extensive calcareous change which is recognized as atheroma *par excellence*. Why this should be so is difficult to explain, and inasmuch as whatever explanation be given must be largely hypothetical, I prefer to do little more than draw attention to the fact of this relationship and to suggest that where, as in my two cases, there is an extensive proliferation of hyaline fibroid tissue there is a development of a tissue at once brittle, and inelastic which still remains organically and intimately connected with the deeper tissues; hence rupture affecting this thickened intima is liable to extend by continuity of tissue into the underlying layers of the media. Where, on the other hand, there is fatty or calcareous degeneration of the intima there is no such organic and fibroid connection; the very necrosis indicated by such degenerations leads to a separation between the dead and living tissues, and rupture thus is little liable to extend by continuity; at most the degenerated tissue breaks away from the underlying healthy layers and an ulcer is the result. Such an explanation does not preclude the possibility that in some cases, as Marchand has suggested, atheromatous changes in the media may be the essential cause. In any case I gravely doubt whether mere strain or trauma ever induces the condition, as Boström urges, wholly apart from antecedent disease of the arterial walls.

That dissecting aneurysms in general are relatively common in the female as compared with other forms of aneurysm is not improbably due to the fact that while an extreme degree of arterio-sclerosis is not so frequent in this as in the male sex, a moderate degree is fairly common. That as compared with the acute form a still larger proportion of females exhibit the condition of chronic or repaired dissecting aneurysm is evidently due to the weaker heart action and lower blood pressure of the sex, in consequence of which once the blood penetrates between the coats of the media there is less tendency to rapid dissection and extension outwards, or yielding and rupture of the outer coats, and once the condition has become developed, greater tendency towards canalisation and repair.

The effect of the blood pressure in determining whether a dissecting aneurysm shall be acute or chronic is well shown by comparing the

relative frequency of site of primary rupture in all cases of dissecting aneurysm with that in the chronic form.

The most satisfactory tables that I have by me for this purpose are those of Peacock, embracing 74 cases of all forms. Of these 74 the primary rupture was situated in 57 cases in first part of the aorta. Of these—

- 38 (66.6 %) died suddenly or within 24 hours.
- 9 died in between 1 and 17 days.
- 5 survived for at least some months.
- 5 of doubtful duration.

8 cases at or near the innominate artery.

- 7 (87.5 %) died suddenly or within 24 hours.
- 1 survived nine months.

7 cases beyond the origin of the left subclavian artery or in the descending aorta.

- 3 (44.4 %) died within 24 hours.
- 1 survived seven days.
- 1 three months.
- 2 of doubtful duration (death from intercurrent disease).

2 cases in the abdominal aorta.

- 0 died suddenly.
- 2 from intercurrent disease.

The above table which I have modified (in shape only) from Peacock's table, shows very clearly that where the primary rupture is near to the heart, there is greater likelihood of sudden or briefly supervening death (and that, in the majority of cases, by extension into the pericardial cavity), while the further it is from the heart—and the less the blood pressure—the fewer the cases of sudden death. At the same time, nearness to the heart does not necessarily lead to sudden death. Thus analysing the cases of chronic dissecting aneurysm here collected it will be seen that the primary rupture had taken place :

Immediately above the valves or in the ascending aorta in	13 cases ¹
Below origin of left subclavian and first part of thoracic aorta	12 cases
Lower part of thoracic aorta	5 cases
Abdominal aorta	1 or 2 ¹
Iliac artery	1 or 3

There is evidently a fair number of cases in which primary rupture of the first part of the aorta did not lead to sudden death, but to the formation of a repaired dissecting aneurysm. Nevertheless, the proportion of cases of dissecting aneurysm, starting from the more distal portions of the aorta, is very striking, when the relative rarity of all forms of dissecting aneurysms affecting these remoter regions is taken

¹ Oliver's case with its stated four separate aneurysms is counted in four times in this table.

into account. In other words, the further the primary rupture is from the heart and the less the force of the blood, the greater the liability for the production of a chronic or repaired aneurysm.

There are many other points brought out by these tables which are worthy of note, but which I can only mention in passing. There is, in the first place, the frequency with which branches of the aorta gain a secondary origin from the sac. The arteries most frequently affected are the intercostals and the lumbar, but a study of the tables will show that every branch, even to the largest, may thus receive its blood supply from the aneurysmal sac, and appear to originate directly therefrom. This, in more than one case, *e.g.* Shroeder Van der Kolk, Bouillaud, has led to the condition being regarded as one of congenital abnormality of the aorta. It is probable that Boström's explanation generally holds, and that such rupture of the aortic branches dates from the moment of dissection. Nevertheless the appearance presented by the right renal artery in my first case suggests that at times the secondary origin may be of later date and due to the degeneration of the unfavourably situated first portions of sundry of the branches given off from the aorta as they traverse the aneurysmal sac.

Lastly, as to the diagnosis. Only once (by Latham and Swaine) has the condition been diagnosed during life. Where, as in our two cases, the lower thoracic and upper abdominal aorta are affected, we have, it is true, a very definite series of associated pains—due largely it would seem to pressure upon the nerve plexuses—but even with similar pains present it is singularly difficult to diagnose an ordinary abdominal or lower thoracic aneurysm. *A fortiori* it is more difficult to diagnose this condition in which during life no definite tumour is perceptible.

CASE.	SEX AND AGE.	PRIMARY RUPTURE.	PLACE OR PLACES OF RE-ENTRANCE.	(1) DURATION. (2) CAUSE OF DEATH.	REMARKS.
1. SHEKELTON * <i>Dublin Hosp. Reports</i> , III., 1822, p. 231.....	F. Mid. Age.	3 in. (7.6 cm.) above aortic bifurcat'n.	R. common iliac art. 3 in. below origin. Common iliac 1½ in. below origin.	(1) Not known. (2) Intercurrent disease.	Dissecting-room subject. Interior of sac perfectly smooth-walled with slight atheromatous patches similar to those in aortic intima.
2. SHEKELTON * <i>Ibid</i>	F. Mid. Age.	Beginning of left common iliac art.	Two orifices lower down in same artery.	(1) Not known. (2) Tuberculosis.	Dissecting-room subject. Aorta showed frequent atheromatous patches. Sac with smooth surface and thick intima.
3. LAENNEC * <i>Traité de l'Ausculta- tion</i> . Paris, 1826, II., p. 606.....	M. 67	About 2 in. from origin of descend- ing aorta.	Not mentioned. Apparently (1) absent, though sac continued (2) to beginning of common iliacs and along coeliac a.r'ts.	(1) More than 1 month. (2) -----	Patient had rapidly emaciated before adm. to hospital. In hospital 32 days. Sudden death without symp- toms of cardiac or resp. disturbance. Atheroma of ascending aorta with dilatation. Sac had firm reddened walls with occasional fibro-cartila- ginous plaques, traversed by inter- costal arteries filled with blood-clot. Injection of vasa vasorum. Aortic wall thick but smooth, with but slight atheroma.
4. HOPE <i>Diseases of the Heart</i> , <i>etc.</i> German transl. by Becker. Berlin, 1833, p. 385.....	F. Mid. Age.	Below origin of left subclavian.	Origin of coeliac axis.	(1) ----- (2) Rupture into medias- tinum. Sudden death.	Sac smooth-walled, thought to be a mal- formation, with aneurismal dila- tation opposite origin. Intercoastal arteries given off from the sac. This case, referred to by Boström, is not given in the English Edition.
5. PENNOCK * <i>Am. J. of Med. Sc.</i> , XXIII., 1833, p. 1, 1st case.....	F. 75	3 in. above aortic valves.	Immediately above bifurcation (1) of aorta. Numerous foramina (2) all along course of aorta.	(1) 8 years. (2) Edema, dyspnoea.	Intercoastal arteries of left side given off from sac. Recognized dissection be- tween layers of media.
6. HENDERSON * <i>London & Edin. Monthly J. Med. Sc.</i> , III., 1813, p. 623.....	F. 60	Below origin of left subclavian.	Left common iliac.	(1) 9 months. (2) Ascites and dyspnoea.	Slight sclerotic thickenings of aorta, more marked of sac. Dissection recognized between layers of media.

7. BOUILLAUD <i>Arch. gen. de Méd.</i> , 4me sér., XV., 1847, p. 248.	M. 36	Immediately above aortic valves.	Beginning of right iliac.	(1) 3 year. (2) Obstruction to circula- tion.	Little yellow flecks and some fibro-car- tilaginous nodules in aorta. Sac, ex- tensive atheroma. Left subclavian given off from sac. Regarded as a malformation.
8. PENNORCK (2nd case)* <i>In 1st Amer. Ed. of Hopp's Diseases of the Heart and Great Vess- els</i> , Philadelphia, 1842, p. 407.	F, nearly 100	Immediately above the valves.	At origins of vessels from aortic arch (two openings), of coeliac axis, and renal arteries.	(1) 3 years. (2) Great general dropsy.	Sac lined by false membrane simulating serousis-sue. Intima of aorta thick- ly studded with cartilaginous de- posits. Upwards of twenty dilata- tions or saccular aneurisms in differ- ent parts of arterial system.
9. GOYRI. <i>Bull. d. l. Soc. Anat.</i> , 1853, p. 276.	M. 52	Immediately above aortic valves.	Opened above into the internal carotid, lower opening at level of left bronchus, other openings at origins of large vessels.	(1) 11 years. (2) Hydropericardium.	Several openings between sac and aorta with passage of some of the larger arteries off from the sac.
10. SCHROEDER VAN KOLK* <i>In Traité's Tabulæ ad. illustr. Embryo- gen., etc.</i> Amsterdam, 1851, Table 88.	M. 30-40	Between 11th and 12th intercostal arteries.	Bifurcation of aorta.	(1) ——— (2) Billious fever.	Inferior mesenteric and right common iliac, last intercostal and some lum- bars given off from sac. Coeliac axis, superior mesenteric and right renal arise from both cavities. Regarded as a malformation.
11. LATHAM AND SWAINE* <i>Trans. Path. Soc.</i> London, VII., 1855-56, p. 108	M. 56	A few lines below origin of left sub- clavian.	Right common iliac.	(1) 3 months. (2) Circulatory obstruc- tion.	Diagnosed during life. In aorta patches of degeneration in various pieces up to cartilaginous hardness. Much clot in sac.
12. LIBERT <i>Traité d'anat. path.</i> Paris, 1857, p. 752.	M. 48	1½ cm. (½ in.) above aortic valves.	Origin of coeliac axis and thro- intercostal foramina.	(1) 2 months after sudden attack. (2) ———	Slight atheroma of aorta. All the inter- costal arteries given off from sac. Sac wider than lumen of aorta. Sac presented abundant evidence of development of new connective tissue layer.
13. V. RECKINGHAUSEN <i>Vierteljahr. XXX.</i> 1844, p. 372.	F. —	1 in. below the liga- mentum arteri- osum.	Origin of coeliac axis.	(1) ——— (2) Pelvic abscess after childbirth.	Apparently of comparatively recent development, with strands of the media crossing the sac. If this be the case referred to by Helmstedter, the condition was of several weeks development.

CASE.	SEX AND AGE.	PRIMARY RUPTURE.	PLACE OR PLACES OF RE-ENTRANCE.	(1) DURATION. (2) CAUSE OF DEATH.	REMARKS.
14. SYMES * <i>Dublin G. J. Med. Sci.</i> , XXXVII., 1864, p. 468.....	M. 50	Above aortic valves	Left common iliac at bifurcation of aorta.	----- (1) Anasarca.	Vessel very much diseased. Many of the branches implicated (innominate, left subcl., branches of left side of aorta.)
15. HESCHL <i>Wein. Med. Wochenschr.</i> , XVII., 1867, p. 90.....	F. 50	Immediately below left subclavian.	Left common iliac 2 in. below origin. Orifices also near left renal.	(1) Several months (2) Bright's disease.	Aorta very slightly atheromatous. Wall of sac presented pigmented nodules (of old blood-clot.)
16. TRAIBICH <i>Inaug. Diss. Wzburg</i> , 1867.....	M. 53	Above aortic valves	Right iliac, origins of lumbar and renal arteries.	----- (1) ----- (2) Bronchitis, etc.	Thick, white, transparent lining to sac.
17. FAGGE * <i>Med. Chir. Trans.</i> , LII., 1869, p. 341.....	M. 71	1 in. above valves. 2nd opening below left subclavian.	Left common iliac $\frac{1}{2}$ in. below origin and right external iliac.	(1) Six years. (2) -----	Aortic intima smooth above, atheromatous below. Sac smooth below atheromatous above. Innominate artery given off from sac.
18. FISCHER G. <i>Inaug. Diss. Nuremberg</i> , 1872..... (Bostrom's 4th case)	F. 67	Between 6th and 7th intercostals. 9 cm. above coeliac axis.	Close to bifurcation of aorta and (2) left renal artery.	----- (1) Sudden death by rupture of sac at origin. (2) -----	Sac with glistening membrane. 10th intercostal given off from sac, as also 2nd or 3rd lumbar. Sac aneurysmal at origin.
19. FRIENLANDER <i>Virehow's Archives</i> , LXXVIII., 1879, p. 357.	M. 67	Immediately above aortic valves.	Left common iliac.	(1) ----- (2) Bronchitis.	Intercostal arteries given off from sac. Sac covered by a layer of new formed tissue similar to normal aortic intima.
20. J. VÜTICH * <i>Virehow Arch.</i> , C., 1885, p. 180.....	F. 36	2.5 cm. (1 in.) above aortic valves.	11 cm. (4 in.) below left subclavian. Other orifices at origins of innominate and left subclavian arteries.	(1) At the least several months. (2) Dyspnoea and oedema.	Innominate and left carotid given off from sac. Aortic intima smooth save in ascending portion but thickened. Wall of sac resembled normal aortic intima. Smooth and glistening.

21. FINNY * <i>Dublin J. of Med. Sci.</i> , LXXX., 1885, pp. 159 and 276, also <i>Lancet</i> , II., 1885, p. 68.	M. 43. 1½ in. above diaphragm.	Bifurcation of common iliac on each side.	(1) 19 months. (2) Asthenia, hemiplegia, &c.	Moderate atheroma of aorta with but few calcareous patches. Coeliac axis, right renal, and lumbar arteries given off from sac. Sacculated aneurysm of anterior wall of sac.
22. JACOBSEN <i>Travag. Diss. Kiel</i> , 1885.	F. 51 Immediately below Ductus Botalli.	Origin of coeliac axis.	(1) Chronic nephritis.	Intima of aorta nowhere extensively thickened. Flattened nodules here and here in sac.
23. GRAHAM (Toronto)* <i>Ann. Jt. of Med. Sc.</i> , n. ser., XCI., 1886, p. 155.	M. Mild. Age. Immediately beyond origin of left subclavian.	Origin of right renal artery. Two or three accessory openings.	(1) More than thirty years. (2) Rupture into left iliac opposite primary opening.	The sac had a corrugated appearance. Right renal and several smaller arteries given off from sac.
24. BOSTROM * <i>J. Arch. f. Klin. Med.</i> , LXXI., 1881, p. 1. Case 1.	M. 61 At level of ligamentum arteriosum.	Origin of coeliac, left renal and primary branches of superior mesenteric.	(1) 22 years. (2) Fontine hemorrhage.	Slight fibroid atheroma of both aorta and sac. Left 10-12th and 1st left lumbar intercostal arteries of left diaphragmatic, left renal and branches of superior mesenteric. Coeliac axis arose from sac.
25. BOSTROM * <i>Ibid.</i> , p. 37. Case 2.	M. 60 At level of ligamentum arteriosum.	Main opening at level of right renal artery. Other openings in left subclavian artery, in several intercostals, diaphragmatic artery and coeliac axis.	Chronic bronchitis.	Slight nodose sclerosis of aortic intima. Several communications between aorta and sac. Sac had glistening inner surface.
20. BOSTROM * Cases 3. <i>Ibid.</i> , p. 42.	F. 37 1 cm. above the valves.	Long, reaching from the origin of the 5th to the level of 8th intercostal arteries.	(1) Six months. (2) Dyspnoea, cedema, albuminuria.	Ascending aorta smooth, descending extensively sclerosed with a few calcareous plaques. Sac had glistening but nodular inner surface resembling a greatly sclerosed aorta. Sac passed down to base of aortic valves. 3rd, 4th and 5th left intercostals given off from sac.
27. FISCHER, F. * <i>Travag. Diss. Metzberg</i> , 1894. Case IV., p. 18.	— 1 cm. above coronary art.	Some point below the intercostal artery.	(1) — (2) —	From a dissecting room subject. Intima of aorta only slightly thickened, media unaltered. Intima of sac smooth with flattened plaques of various sizes.

CASE.	AGE AND SEX.	PRIMARY RUPTURE.	PLACE OR PLACES OF RE-ENTRANCE.	(1) DURATION. (2) CAUSE OF DEATH.	REMARKS.
28. FISCHER, F. * <i>Ibid.</i> Case IV., p. 21.	M. 57	2 cm. above aortic valves.	At level of renal arteries and into right carotid about 3-4 cm. from origin.	(1) 3 years. (2) Dyspnoea, emphysema, renal disease, oedema, sudden death.	Atheromatous plaques of aortic intima, with occasional plaques of thickening. Intima of sac of irregular thickness, but glistening. All the intercostals given off from sac.
29. AUTHOR'S First Case.....	M. 64	1 1/2 in. (3-25 cm.) above origin of coeliac axis.	Lower end of rt. external iliac and origin of left femoral.	(1) More than eleven months. (2) Sudden death.	Nodose arterio-sclerosis of aortic intima of hyaline fibroid type. Several lumbar intercostals given off from the sac. Accessory recent communication at origin of right renal.
30. AUTHOR'S Second Case.....	F. 48	3 cm. above coeliac axis.	No orifice of re-entrance.	(1) Eleven months. (2) Rupture of aneurysm of sup. mesenteric.	Nodose arterio-sclerosis of aortic intima of gelatinous appearance. Sac almost filled with firm mass of clot, on removal of this smooth intima disclosed.

CASES APPARENTLY OF THE SAME NATURE, BUT CONCERNING WHICH THE INFORMATION GIVEN IS INCOMPLETE.

CASE.	AGE AND SEX.	PRIMARY RUPTURE.	PLACE OR PLACES OF RE-ENTRANCE.	(1) DURATION. (2) CAUSE OF DEATH.	REMARKS.
31. GORDON * <i>Proc. Path. Soc.</i> , Dublin, 1863-4, II., p. 81.	M. 50	Near origin of aorta.	Left common iliac (2)	15 days. Paralysis of legs, gangrene and dysentery.	Complete separation of coats.
32. KNOTT * <i>Ibid</i>		Junction of transverse and descending aorta.	Termination of both common iliacs.		Dissecting-room case. Like "double-barrelled gun."
33. EDWARDS AND STONE * <i>Trans. Path. Soc.</i> , Philadelphia, VI., 1878, p. 38.....	M. 46	Abdominal aorta. (no description.)	Not mentioned, apparently wanting.	(1) More than 18 months. (2) Progressive emaciation.	Pain in left hypochondrium and lower dorsal region. Aorta highly atheromatous. Sac large and distended, filled with highly organized blood clot. Report of morbid growths committee "a dissecting aneurysm."
34. OLIVER, T. * <i>Lancet</i> , I., 1892, p. 1068.....	M. 55	(1) $\frac{1}{2}$ in. before origin of innominate. (2) Junction of transverse and descending aorta.	Right carotid artery. (3) 2 in. above bifurcation of aorta.	At least 17 months.	Description given very incomplete and unsatisfactory; from clinical history evidently of long duration. Innominate artery dilated and thrombosed (old thrombosis). R. carotid completely blocked, blood circulating through dissecting aneurysm. Common iliac distended and thrombosed.
35. ELSWORTHY <i>Brit. Med. Jour.</i> , 1896, I., p. 395.....	M. 51	1 in. above valves.	Passed upwards to bifurcation of aorta (2) opening. Passed upwards to bifurcation of aorta. ? Left external iliac 1 in. from origin.	(1) $4\frac{1}{2}$ years. (2) Rupture of sac into pericardium.	Left iliac artery extremely atheromatous, containing small calcareous plates. Aorta atheromatous.

REPORT ON
A YEAR'S WORK IN BACTERIOLOGICAL DIAGNOSIS
OF DIPHTHERIA.¹

BY

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Until a year ago no considerable number of bacteriological examinations had been made of diphtheria cases in Montreal. During the twelve months ending March 31st, 1896, there were sent from the two laboratories of which I have charge, 998 samples of exudation examined as to the presence of the diphtheria bacilli. Of those 528 were examined at the Provincial Board Laboratory, including samples from all cases admitted into the diphtheria wards of the Catholic section of the Civic Infectious Hospital, and 470 at the General Hospital Pathological Laboratory, including samples from each case admitted as diphtheria into the Protestant section of the Civic Hospital.

The examination was made by me personally in 729 cases. The remainder were examined by either Dr. J. E. Laberge (128), Dr. W. H. Jamieson (89), Dr. J. A. Williams (5), or the late Dr. E. P. Williams (47), who at one time or another kindly undertook my work during my illness or absence.

Methods—The methods followed were in the main those adopted by the New York Board of Health, which was the first sanitary body to introduce a system of wholesale bacteriological examination in diagnosing diphtheria. The fact that this precedent has been followed within two years by the establishment of similar services in many large American and European towns, and that in no case have any very important modifications or improvements been introduced, speaks volumes for the efficacy of the system originated by Drs. H. M. Biggs and W. H. Park.

The Board of Health of the Province of Quebec considered that cheap card-board boxes which could be destroyed when once used would be preferable to the more elaborate outfits in use elsewhere, and in view of the greater uniformity of results obtained the Board has only issued outfits with swabs, the cultures being made in the laboratory. Suitable blanks for filling in reports are sent out

¹ Read before the Montreal Medico-Chirurgical Society, April 3rd, 1896.

with each outfit and these outfits are left at pharmacies conveniently situated for all parts of the city. The fact that the service was a provincial and not a municipal one made it necessary that we should not attempt to do more for Montreal than we were prepared to do for the entire province, and therefore the enforcing of quarantine and local notification arrangements are not attempted, nor is a daily collection made from the depots, as should certainly be done in the case of a municipal diphtheria service.

Unfortunately the absence of permission to use the mails for transmitting samples of throat exudate has made it difficult to get samples to the laboratory in time for sending a report on the following day, and this has often prevented physicians from availing themselves of the facilities offered by the Provincial Board of Health.

*Preparation of the medium*¹—I have employed throughout Loeffler serum, made by adding $\frac{1}{2}$ volume of alkaline, 1 p.c. peptone, 1 p.c. glucose beef broth to ox-blood serum, simultaneously sterilized and coagulated in a water oven. (Hueppe's method.) This medium gives a good growth at the end of 12 to 14 hours. The trouble and delay of frequent visits to the abattoir has been avoided by preparing large quantities of the serum at a time, adding with the glucose bouillon as a preservative, 1 to 2 per cent. chloroform and keeping it in self-sealing preserve jars until required for filling the tubes. I have used this method (suggested originally by Koch) since 1892 with a very satisfactory results, and have still a reserve supply of serum kept by this means in ordinary corked vials since 1892, which was recently tested and found to yield a satisfactory medium. 3

It may be well to mention that if the serum contains much blood this will form a compact layer over the chloroform in the bottom hence it is better to shake the jar occasionally during the first few days.

By wrapping tin-foil round the tops of the tubes and dipping them into paraffin, they may be kept indefinitely without drying up. The tin-foil prevents the paraffin from entering the cotton wool. I owe the suggestion to Dr. Adami.

Method of taking samples—A small galvanized iron rod with a piece of cotton wool is twisted round the end sterilized and placed in a sterilized tube, enclosed in a card-board box, with directions for use, forms the outfit of the Provincial Laboratory. In the case of the General Hospital Laboratory, a serum tube, for making the culture at once, is sent with the swab.

¹ Hard boiled eggs have been used as a culture medium from time to time when we happened to be short of serum in the laboratory, but I found they require more time and skill in order to properly make culture than is the case with the serum sterilized in tubes.

It is better not only to rub the surface of the exudate with the swab, but also to pass the swab along under one edge of the exudate (Mac Collum), as bacilli may sometimes be met with in this situation after they have disappeared from the surface. In cases of laryngeal or nasal diphtheria, the bacilli are usually present in the mucus on the posterior wall of the pharynx. In case of negative results inoculation should be made, if possible, with pieces of membrane. It must be borne in mind that in some cases of diphtheritic croup, the bacilli may only appear late in the disease.

The use of ordinary cotton wool (as recommended by Shuttleworth) is preferable to absorbent cotton. The swabs should be thoroughly sterilized before use.

The result of the examination is communicated by mail, and also by telephone if desired, by noon on the day following the receipt of the swab at the laboratory.

In the cases of an anomalous growth or none at all on the serum, I have been in the habit of examining the swab microscopically, but my experience is in accord with that of Park, that the routine examination of the swab in all cases seldom gives additional information or enables a certain conclusion to be arrived at earlier than by the ordinary culture methods. The direct microscopic examination is a work which falls within the province of the clinician rather than of the laboratory bacteriologist.

I have tabulated 882 samples received during the twelve months ending March 1, 1896. Of these 572, or 64 per cent., were primary examinations or first samples and 310 secondary samples examined subsequently, either to determine when the throat became clear from bacilli in the genuine cases, or for the further study of doubtful ones.

Of 572 primary samples, 321 (56 per cent.) gave positive results; 189 (33 per cent.) negative results, and 52 (11 per cent.) doubtful results. So that we had to deal presumably with rather more than 321 cases of genuine diphtheria.

The relative frequency of mixed infection is shown from the following table of primary samples:

Klebs-Loeffler bacilli in pure culture.....	43 per cent.
“ “ with streptococci.....	15 “
“ “ with staphylococci and streptococci.....	13 “
“ “ staphylococci alone.....	10 “
“ “ pneumococci.....	5 “
Short bacilli and other combinations.....	4 “
	100

Unfortunately I had no opportunities for determining the relative mortality of the different associations and my information as to the

relative benefits from antitoxin in each is too fragmentary to have any value.

Persistence of Infection in the Throat—Of 310 re-examinations or secondary cultures, made to see whether the bacilli had disappeared from the throat in the later stages or in the event of a doubtful result in a primary culture, 145 or 47 per cent. gave positive results. Among these there was only one case (E. C.) where the bacilli were missed at the first examination and found subsequently. This was a case of laryngeal diphtheria following pharyngeal, where the case was first examined bacteriologically on the ninth day of the illness. As a rule the bacilli become scanty in a membrane that has been formed more than four days, though in some cases they were abundantly present for several weeks after the disappearance of the membrane, and in two cases virulent bacilli were still present four weeks after the throat had been quite free from membrane.

On the other hand, they were absent in about one-half the cases by the third day after the disappearance of the membrane, corresponding with the statement made by Park. Under these circumstances the advantages of a quarantine regulated by bacteriological examinations over one with an arbitrary time limit is obvious.

In cases treated with antitoxin the bacilli persisted as long in the throat as those treated without antitoxin. Personally, from what is known of the biology of the diphtheria bacillus and especially its tendency to die out or fail to increase in the presence of very weak acids, I should favour some mild treatment by lozenges or confection containing a weak organic acid, such as citric acid, by which an acid condition of the fauces could be kept up would be the most promising way of getting rid of the bacilli, but I have had no opportunity of testing this. I notice also that no note is made of the reaction of the fauces with reference to the persistence of bacilli.

Significance of Negative Results—With regard to the significance of a negative result, it depends altogether upon the stage at which the sample is taken. In case of negative results we have always requested the sending of secondary samples if anything in the course of the case tended to show that the case was really diphtheria. The result in these cases was almost universally negative. Out of 189 cases with negative results I have been able to hear of but two cases, where a visible membrane gave negative bacteriological results in the early stage, being followed by diphtherial paralysis.

The chief difficulty to the bacteriologist in interpreting these negative results is the absence of certain information that the sample has been properly taken. The occurrence of diphtherial paralysis

I regard as conclusive evidence that the case was really diphtheria. When the clinical diagnosis is positive I think that even after negative bacterial results, samples should be taken at intervals of a day or two in case of a re-infection. In any case, a negative result shows that the exudate is not at the time in a state likely to spread infection.

It was not found, as a rule, that the taking of duplicate samples at the same time gave any additional information, though in one case bacilli were absent in one sample and present in a duplicate taken at the same time. Additional samples taken after an interval of 12 to 24 hours were more often of service.

In any case where the patient has been ill for four or five days the absence of bacilli in the cultures, even from visible membrane, should not be considered as proving that the case is not one of diphtheria. When the sample is taken from cases with no visible membrane the negative results are less trustworthy, but as a rule in cases of croup the posterior wall of the pharynx gives an abundant growth of diphtheria bacilli. Some throat swabs taken from fatal cases of croup not diagnosed during life were found to give positive results, a method which might be made to yield valuable statistical information in a properly managed system of death certification. The fact that so-called simple croup is credited with causing in Montreal double the number of deaths due to typhoid should make this question worth investigation.

Doubtful Results—In 11 per cent. of the primary cases the results of the first culture were not decisive; of these 1 per cent. showed entire absence of growth, due to the use of antiseptic applications shortly before taking the sample. Sometimes organisms, apparently characteristic Klebs-Loeffler bacilli, were present in such small numbers that they did not correspond with the known tendency of diphtheritic bacilli to rapid growth as compared with other organisms. In such cases a second culture was uniformly asked for and obtained, but it was just as uniformly negative, except when obtained in the late stages. If one is sure that the sample, properly taken from visible membrane in an early stage, gives negative results, there is very little danger of the case being diphtheria. With regard to the late cases in which few bacilli are met with, it is likely at all events that the danger of infection will be as slight, so long as the bacilli are scanty in the exudate.

The routine advice has been to keep such cases isolated and send further samples. In case they are exposed to danger of infection from undoubted cases of diphtheria, or removed to an infectious

hospital, a small dose of antitoxin would confer immunity. This power of immunization offsets to some extent the lack of any proper isolating wards for observation of doubtful cases in our contagious hospital. With a scanty growth of suspicious looking bacilli, I am inclined now to look upon the case as probably not diphtheria, if in an early, or probably not highly infectious if in a later stage. As severe angina so often proves to be a manifestation or complication of scarlatina or some other exanthem, I favour isolation in a fever hospital, if not obtainable otherwise, as being the safest plan for the public safety. The clinical course of these cases, however, often shows them to be tonsillitis by the end of 24 or 48 hours. My experience of such cases has been decidedly that they are not infectious. They usually improve suddenly if left to themselves, and so if a dose of antitoxin happens to be taken this may create the impression that the case was really diphtheria. The absence from the cultures of a sufficient number of streptococci to explain the condition of pseudo-membranous angina is suspicious of diphtheria, as most of the non-diphtheritic anginas are due to streptococci. As I have information about several cases, not diphtheria, benefited by antitoxin, I think its employment in all doubtful cases should be the rule if the symptoms are grave, especially if there are evidences of croup. Our experience in the Hospital laboratory has been that an unusual number of doubtful results were found in connection with private cases. It was the rule in such cases to find a considerable number of suspicious looking bacilli in many cases which we did not consider to be diphtheria. The only explanation which suggests itself to me is, that the samples were taken in these cases with unusual care, and an unusually liberal amount of the exudate was smeared on the culture media, and that under these circumstances a certain amount of growth in the natural secretions of the pharynx may have been possible with germs which do not grow on Loeffler serum. Sometimes, where the growth was scanty, portions of the exudate itself would be removed from the serum in examining the culture. The presence of bacilli in the exudate, which do not grow on the media, is against the probability of diphtheria.

An abundant growth is sometimes found of a bacillus which does not have the typical characters of Klebs-Loeffler bacilli.

These cultures constituted between 1 and 2 per cent. of all the samples examined and were extremely puzzling. They usually occur in groups, and are associated with contact or exposure to genuine diphtheria. None of them were fatal in my experience, though two or three were followed by pharyngeal paralysis. The membrane

formation was described as not being typical but usually thick and pultaceous, and in some cases no distinct membrane was formed.

In one such case, the rather large organism met with grew on potatoes as a distinct white colony, excluding it from the category of Klebs-Loeffler bacilli. It killed guinea pigs by septicaemia without the characteristic hæmorrhagic infiltration of the diphtheria bacilli.

In the case of genuine diphtheria bacilli, a certain proportion of the rods stain intensely, almost black, with warm carbol fuchsin. In the case of the pseudo-forms this was not the case, the staining being more uniform and much fainter.

In another case an organism forming long rods was obtained in pure culture and killed guinea pigs in the typical manner with the characteristic lesions.

In a third case, without any diphtheritic membrane, an organism was met with which was twice as long and thicker than the Klebs-Loeffler bacillus in the first culture, but on making sub-cultures in successive generations became typical, and later on showed typical growth from secondary throat cultures.

This tendency of bacilli, when in considerable amount in the first cultures, to revert to the well-known Klebs-Loeffler type in sub-cultures and their tendency to show virulence to guinea pigs, has made it hard to decide that any bacillus is not Klebs-Loeffler bacillus if it is found in abundance in a primary culture, no matter how far it may be removed from the orthodox standard morphologically.

The most satisfactory mode of procedure is, of course, the inoculation of guinea pigs, but to do this properly involves delay. In the first place, the original throat cultures are nearly always too thickly sown to allow of the immediate isolation of pure cultures without preliminary separation upon surface of serum tubes, which means usually a delay of a day. When a pure culture is obtained conclusive results can only be assured by inoculation of a bouillon culture, which means a delay of one or two days more. Finally, if the full degree of virulence is not present, the animal may take two or three days to die. In any case, as pointed out by Roux and Yersin and by Park, the fact that one colony grown from a sample is not virulent, does not show that another of the same bacillus from the same case may not be, as the virulence of different colonies, even in the same case, has been shown to vary greatly. The formation of acid or alkali can be more readily determined, but also requires isolation of pure cultures in order to be used.

The delay and trouble attendant on this test by inoculation contrasts very unfavourably with the convenience and rapidity of the rest of the technique for quarantine purposes. I have obtained more satis-

factory results from simply making secondary cultures; it will be found either that the bacilli are absent from the cultures or that more typical forms are met with.

Where there is definite growth of bacilli from the throat, the case should be provisionally regarded as one of diphtheria until shown to be otherwise, whether the clinical symptoms and the morphological characters are typical or not, as the tendency to variability is far more distinctive of the diphtheria bacillus than any one of the forms in which it occurs.

Visible growths on acid potato, or motility and formation of alkali are sufficient to characterize any organism showing them as something else than the Loeffler bacilli.

Significance of Positive Results.—When a typical heavy growth of a bacillus, corresponding in appearance with the Klebs bacillus, is met with, there need be no hesitation in declaring that the conditions for diphtheritic infection are present, whether the clinical symptoms correspond or not, and whether there is visible membrane or not.

Of the 293 primary samples examined at the Provincial Board of Health Laboratory, 43, or 13 per cent., were from cases diagnosed clinically as follicular tonsillitis, quite apart from a number more where the diagnosis was stated to be possibly or probably diphtheria. Of these 43 cases diagnosed as tonsillitis, 19, or 45 per cent., were shown to be diphtheria. This result was confirmed by inoculation experiments in a number of my earlier cases, the result being uniformly positive in every case where it was tried. This experience tends to shake one's confidence considerably as to the efficiency of the diagnosis of tonsillitis from diphtheria without making cultures. As to the recognition of diphtheria from tonsillitis, of 292 primary samples sent to the Provincial Bacteriological Laboratory, only 173, or 59 per cent., gave positive results, and of 279 primary specimens sent to the pathological laboratory of the Montreal General Hospital only 148, or 53 per cent., gave positive results. Possibly many of these were only sent as an additional precaution in cases clinically considered as tonsillitis, but we found that cases called follicular tonsillitis were really diphtheria 45 times out of 100.

We may assume that when a patient is sent to a diphtheria ward in an infectious hospital some good grounds exist for diagnosing the case, but in the case of the Catholic division of the infectious hospital of 73 primary samples from cases sent as diphtheria, only 46, or 66 per cent., showed the presence of diphtheria bacilli, while 25 or over showed none.

In the case of the Protestant section of 92 primary samples, 81, or

87 per cent., showed the presence of diphtheria bacilli and 11, or 13 per cent., showed none. The difference between the results of the two sections appears to be due to the fact that a preliminary bacteriological examination was made in a large number of patients at the Montreal General Hospital before forwarding cases recommended for admission as diphtheria.

From the above, I have omitted from the negative result in each division, two patients admitted in the paralytic stage of undoubted attacks of diphtheria, but from whose throats the bacilli could no longer be obtained.

The results go to show the advisability of making, whenever possible, preliminary bacteriological examinations of cases before sending them to the infectious hospitals, and also of providing properly isolated observation wards in the infectious hospitals for the reception of doubtful cases. A precautionary immunising dose of serum will considerably lessen the danger of an infection resulting from mistakes in diagnosis, but it will not wholly guard against it as I have met with several instances of diphtheria infection, confirmed by bacterial examination, among persons supposed to be protected by doses of the antitoxin.

Accuracy of Various Methods of Diagnosis.—The delicacy of the positive clinical diagnosis of diphtheria has been seen in our 572 cases to be somewhat over 60 per cent. The bacteriological diagnosis has, in my experience, shown an accuracy of somewhat over 90 per cent., that is to say, a doubtful opinion had to be given in one case out of every ten primary samples examined, and the subsequent course of the cases usually showed them not to have been diphtheria. The chief difficulty in giving a diagnosis is the uncertainty from not having personally made the cultures.* I found a greater uniformity of the results in the Provincial Laboratory where all the tubes are inoculated by one attendant who strictly followed my instructions, than in the hospital laboratory where they were made by various physicians.

Probably had specimens been indiscriminately sent me in all cases the percentage of genuine cases would have been greater, but naturally one had a preponderance of the obscure cases as, by some physicians, samples were only sent from those which were puzzling.

The positive results were equally frequent in the case of the hospital cases, where cultures were made at once on serum and forwarded to the laboratory, and in those of the Provincial Laboratory,

* In one case shown by autopsy to be laryngeal diphtheria a physician inoculated a tube which gave negative results. A few hours later in performing a tracheotomy on the same case he accidentally inoculated his own hand, producing a sloughing wound from which we obtained a pure culture of Klebs-Loeffler bacilli.

where the swabs were sent to the laboratory and the culture made as a rule only after several hours delay.

Diphtheria Bacilli in the Throat of Apparently Healthy Persons—The occasional occurrence of bacilli, like the diphtheria bacillus, so-called pseudo-diphtheria bacilli, in the throat of apparently healthy persons appears to have received an undue amount of attention with reference to its practical bearing upon the diagnosis of diphtheria. These bacilli have very seldom been met with in the overwhelming numbers which characterize the early stages of diphtherial infection, and therefore are not likely to give rise to serious errors of diagnosis in cases examined early.

On the other hand, it has been abundantly demonstrated that the virulent diphtheria bacilli may exist in large numbers in the throat of persons who are apparently healthy and who certainly do not present any of the clinical features of diphtheria, and this important discovery viewed in its true light should materially influence one's course in dealing with outbreaks of this disease in households or public institutions such as schools, hospitals and asylums.

Instead of isolating and examining bacteriologically only those cases which have sore throat, all the throats in the institution or household should be examined bacteriologically and those persons from whom a culture of diphtheria bacilli is obtained should be isolated and quarantined, whether they are ill or not, until no bacilli are found in the throat cultures.

This is probably the explanation of the difficulty often experienced in preventing the spread of diphtheria in households or public institutions, even after all persons actually ill have been rigidly quarantined.

Attention to this mode of infection by the New York Board of Health has led to most satisfactory quarantine results, and Aaser, of Copenhagen, has recently reported an outbreak in a cavalry regiment which continued to spread after all the sick persons had been isolated and thorough disinfection performed, and was only controlled when 19 persons, apparently healthy, but whose throats furnished growths of diphtheria bacilli, were quarantined.

Use of Antitoxin.—The twelve months under consideration, cover pretty accurately well the first twelve months' experience with the use of antitoxin and therefore the first years in which a specific remedy was available for the treatment of this disease. It is of special interest to study the frequency of diphtheria in the city during this period and see what effect this new remedy, whose efficacy is undoubted, has had upon the diphtheria death rate.

From the records at the City Health Office, to which Dr. Laberge, City Health Officer, kindly gave me access, I find that during the period in question 849 cases of diphtheria and diphtheritic croup were reported at the health office, besides 83 cases reported as simple croup.

The mortality from diphtheria and diphtheritic croup was 282, and in addition there were 100 deaths from so-called simple croup. Probably three-fourths of the cases of this latter disease were really diphtheria. In Montreal the term of "simple croup" was recently invented to cover obscure throat cases in which notification is permissible but not obligatory, in the hope that it may lead to cases being reported which would otherwise not be heard of. If the cases thus reported were examined bacteriologically valuable information would be obtained. The deaths registered under this heading, in spite of its harmless and reassuring sound, are twice as many as those occurring from typhoid fever in Montreal.

The total mortality for diphtheria and croup was thus in the neighbourhood of 400 for the twelve months under consideration and double that observed in any one year since 1888, the mortality from diphtheria and croup in the intervening years being as follows; 1888, 427; 1889, 200; 1890, 170; 1891, 78; 1892, 54; 1893, 65; 1894, 99; 1895, 419.

Without going into the proportion of the deaths in the different years to the increasing varying population of the city, I wish to call attention to the fact that during the first year of the antitoxin treatment, and in spite of the fact that this treatment was very generally carried out in private patients who could afford it and among hospital patients who get it without paying, and while special statistics show a decided lowering in the death rate, nevertheless in Montreal, twice as many persons died from diphtheria during 1895 as during any of the previous six years. This probably does not depend at all upon any better enforcement of notification in diphtheria cases, as it includes both diphtheria and croup.

My reason for emphasizing this is to show that the rigorous enforcement of the standard quarantine measures of isolation and disinfection is not rendered less necessary by the introduction of the new specific remedy. Indeed I consider that by converting a severe disease into a mild one the tendency of the patients to go about before the danger of infection had disappeared must be increased to an extent which offers a new element of danger, unless quarantine is very strictly enforced. Even physicians hardly realize the necessity of enforcing a tedious quarantine and isolation for what has apparently been trivial illness which improved promptly under antitoxin.

Another matter which calls for notice is the practice of withholding antitoxin until the diagnosis of diphtheria is clear. Probably a large proportion of the deaths from diphtheria arose from delay in the use of this remedy. One would think it better that the remedy should be given ninety nine times to persons not having diphtheria than to omit it in one genuine case.

I was often told that a report was wanted in order to determine whether it is necessary to use the antitoxin or not. The invariable answer has been not to delay the administration of antitoxin for a bacteriological report if the case is at all urgent. Although the coincidence of the discovery of this remedy has led to an increased interest in the diagnosis of diphtheria, the unavoidable delay of 15 to 24 hours makes it inadvisable to delay a preliminary "protective" dose of the remedy until the diagnosis has been confirmed. In any case, observations have shown marked benefit in certain forms of angina solely due to staphylococci and streptococci when diphtheria bacilli were found to be absent.

Conclusions.—1. The culture method enables a positive diagnosis to be made in 90 per cent. of all cases of diphtheria when seen early.

2. The significance attaching to a negative result depends entirely upon the length of time which has elapsed since the onset of the disease, and the absence of bacilli from a case which has lasted often four or five days does not prove that it is not diphtheria; in any case where the course of disease makes it likely to be diphtheria, repeated re-examination should be made.

3. In severe cases of suspicious angina, it is advisable not to delay the preliminary dose of antitoxin in order to learn the result of the bacteriological examination.

4. The greatest value of the bacteriological examination is in determining the necessity and the duration of isolation and quarantine, and if cases continue to appear, the throats of all persons exposed to contagion should be examined whether they show signs of disease, or not. A swabbing to be taken post-mortem in all cases of death from croup.

5. The patients should not be released from quarantine and the final disinfection of the premises should not be done until the bacilli have disappeared entirely from the affected part.

6. The bacilli have been shown to infect articles of clothing, furniture, etc., and these should be thoroughly disinfected, preferably by steam under pressure, and solutions of mercuric chloride. Fumigation by sulphur is unreliable in the majority of cases as commonly carried out.

7. Cases showing a heavy growth of bacilli, on serum at 20 hours, not quite of the typical Klebs-Loeffler type, should be regarded as suspicious and strictly isolated until their non-diphtherial nature is clear. In order to avoid the conflict between the opinions of the medical attendant and the bacteriologist, it is preferable when a case is diagnosed clinically as non-diphtheritic shows a growth of bacilli, that the further tests of acid production and pathogenes is to be applied, the medical attendant being informed of the suspicious nature of the case and of the necessity of isolation pending more thorough bacteriological study. This would remove a common cause of friction between the medical attendant and the Health Officer and lead to the more careful study of the doubtful cases.

8. In spite of the use of antitoxin and the great benefits resulting from it, the mortality of diphtheria has greatly increased in Montreal during the past year.

RETROSPECT OF CURRENT LITERATURE.

Medicine.

Cardiac Complications in Gonorrhœa.

HIS. "Ueber Herzkrankheiten bei Gonorrhœe."—*Berl. Klin. Woch.*
1892, 993.

LEYDEN. "Ueber Endocarditis Gonorrhœica."—*Deut. Med. Woch.*
1893, 909.

COUNCILMAN. *Amer. Jour. Med. Sci.*, 1891, 1.

DAUBER AND BORST. "Maligne Endocarditis im Anschluss an Gonorrhœe."—*Deut. Arch. Klin. Med.*, 56, 231.

THAYER AND BLUMER. "Ulcerative endocarditis due to the gonococcus; gonorrhœal septicæmia."—*Johns Hopkins Hospital Bulletin*, April, 1896.

Until recently gonorrhœa has been regarded as a local disease. With the exception of arthritis the local manifestations only have attracted attention and visceral complications, although occasionally referred to, have not been generally recognised. The discovery of the specific micro-organism of the disease has, however, directed attention to certain secondary lesions, especially in the heart, and the demonstration of the gonococcus in distant parts has shown that a broader view of the disease must be taken than formerly.

Owing to the occurrence of arthritis the heart has been subjected to careful examination by all clinicians, and it has been very generally recognised that endocarditis very seldom occurs. Indeed, it is usually laid down as a diagnostic rule that the presence of a murmur is a point against the gonorrhœal origin of any given case of arthritis. Whilst this rule still holds in the majority of instances, numerous cases now recorded force us to recognise the fact that endocarditis may occur in gonorrhœa, either associated with arthritis or less com-

only in its absence. Myocarditis and pericarditis are also complications which occur, although less frequently than endocarditis.

The demonstration of the gonococci in the myocardium (Councilman), and also in the valves in endocarditis, completes the proof of the relationship between gonorrhoea and the cardiac affections occurring in this disease.

Unfortunately almost all writers on this subject rely on the anatomical reactions of the gonococcus for its identification. Cultures have either been omitted at the autopsies or have proved negative, owing to difficulties of growing the organism on culture media. Thayer and Blumer have, however, succeeded in obtaining a pure culture of the gonococcus in a case of fatal gonorrhoeal endocarditis. Streptococci and staphylococci have been found in the secondary lesions of gonorrhoea as the result of a mixed infection.

Many of the reported cases of endocarditis have resulted from a very mild attack of gonorrhoea and have appeared after the visible purulent discharge was arrested. Both the benign and ulcerative type of endocarditis have been recognised, the latter being much the rarer of the two. From an etiological standpoint the ulcerative cases are the more important, as it is only in them that the final pathological proof can be obtained.

The symptoms do not differ from other forms of ulcerative endocarditis and the diagnosis is based on local evidence of valvular disease, fever, rigors, emboli in the various parts of the body, nephritis and splenic enlargement.

In His's case the first symptom was a slight syncopal attack coming on seven weeks after the onset of a mild attack of gonorrhoea, in which the discharge lasted only four weeks. A few days later fever, rigors and urethral discharge appeared, and during the week ensuing a cardiac murmur, capillary hæmorrhages on the soft palate and a macular rash resembling a syphilide made their appearance. The temperature was remittent, profuse sweating and a cutaneous hæmorrhage with an anemic centre (infarct) also developed, and death occurred two months after the onset of the gonorrhoea.

At the autopsy ulcerative endocarditis of the aortic valve and a softening puriform thrombus was present in the left ventricle. Gonococci were present in the cardiac vegetations, but were absent in the infarcts, in the spleen, kidney and lungs.

The pelvic plexus was found thrombosed and a hæmorrhage was present in the testicle, neither of these conditions presenting symptoms during life. Polyuria and central deafness which were noted during life were correctly referred to embolism of the medulla.

Leyden's case was preceded by a gonorrhoeal arthritis, and proved fatal about a fortnight after the first physical signs of cardiac disease developed. The diagnosis rested on the local physical signs of cardiac disease, irregular fever with repeated chills, vomiting, nephritis and the rapid and malignant course of the disease. Gonococci were found in the valves but no cultures were obtained.

Dauber and Borst's case, in addition to certain local complications, presented a tendo-vaginitis of the hand (gonorrhoeal?) and myositis abdominalis (gonorrh. ? rheumatic ?).

Three weeks after the onset of urethritis the patient had a rigor, remittent fever and an enlarged spleen, and later evidences of regurgitation and nephritis. A terminal pneumonia developed.

At the autopsy bacteria were found in pairs resembling gonococci in being within the cells, and in being decolourised by Gram's method and by alcohol. Of a number of cultures one only succeeded, showing diplococci of precisely the same anatomical and staining characters as those in the valves. The culture, however, was clearly not one of Neisser's gonococcus owing to the absence of outgrowths or daughter colonies at their borders, a character which is so characteristic of the gonococcus.

The authors therefore conclude that the endocarditis was produced by a micro-organism resembling Neisser's gonococcus, but distinct from it, as shown by the culture. They regard the urethra as the origin of the infection, owing to the absence of any other source.

Although not denying the probability of gonorrhoeal endocarditis, they demand the identification of organisms by cultures as well as by microscopic and staining reactions.

Thayer and Blumer's case is the most important and conclusive yet published. The patient, a woman of 34, had rheumatism three months before admission, but stated that the joints were not swollen and that she was confined to bed for ten days only.

When examined she was a trifle cyanotic; pulse small, 132; temperature 102.2° . The apex beat was in the nipple line; a systolic and presystolic murmur and thrill were detected at the apex. Splenic enlargement and albuminuria were present.

During the illness there was fever with irregular exacerbations of temperature and rigors. The patient became much emaciated and sallow; death occurred about three weeks after admission.

At the autopsy ulcerative endocarditis of the mitral valve, with large vegetations projecting into the auricle, was found, together with splenic enlargement, acute and chronic nephritis and infarcts of the spleen and lung.

Gonococci recognised by their microscopic and staining reactions were found in the vagina and in the cardiac valve, but were absent from the organs.

Cultures from the heart proved negative, owing to the absence of proper media, but blood drawn from the median vein during life and mixed with agar showed typical growths of gonococci. This medium owing to the large amount of blood employed was peculiarly favourable to the growth of the organisms. The cultures further resembled gonococci in not developing in transplantation to ordinary media and in their microscopic and tinctorial characters.

The authors conclude that the organism found in pure culture in the blood and the micrococci on the affected valve were the gonococci of Neisser.

1. Its form and arrangement were identical.
2. While present free the cocci were frequently found crowded in the protoplasm of leucocytes in the thrombus in the mitral valve.
3. It refused to grow on the ordinary media.
4. It grew readily upon a mixture of human blood and agar-agar (one-third blood).
5. It decolorized with Gram's method.

Cure of a Case of Pseudo-Leukæmia.

MORITZ KATZENSTEIN. "Cure of a case of pseudo-leukæmia by subcutaneous injections of arsenic."—*Deutsch. Arch. Klin. Med.*, 56, p. 120.

That arsenic exerts a remarkably beneficial effect on many cases of Hodgkin's disease is very generally admitted. Under its influence the anæmia and general health of the patient often improve rapidly and diminution in the size of the glands is also observed. Unfortunately, however, this improvement only continues to a certain point and relapses occur which ultimately prove fatal.

The case reported by Katzenstein is therefore of unusual interest, inasmuch as complete recovery ensued. The patient, a man aged 37 years, came under observation in January, 1894, stating that a general glandular enlargement had been present for two months. He had also suffered from weakness and he was cachectic and emaciated. The inguinal glands were most enlarged, reaching the size of the fist, whilst the axillary, cervical and cubital glands were also increased in size. There was a diffuse bronchial catarrh and splenic enlargement. The blood count gave 4,720,000 red and 12,200 white cells. Epistaxis and œdema of the lower extremities were also noted.

Arsenic was given subcutaneously in the form of Fowler's solution, beginning with a dose of $1\frac{1}{2}$ mm. and gradually increasing to 15 mm. The treatment was continued for six months, during which time all evidences of the disease disappeared. The glandular swelling and splenic enlargement completely disappeared; the appearance of the patient assumed that of health and there was a complete recovery of bodily strength.

The case is reported five months after the cessation of treatment, and although the criticism may be offered that the time is rather short to be sure of a permanent cure, still such a brilliant result is very unusual.

The patient seems to have experienced no inconvenient local results from the use of Fowler's solution. For hypodermic use a 1 per cent. solution is certainly much less irritating and less liable to produce painful local swellings.

F. G. Finley.

Surgery.

Method of Operating in Appendicitis.

WHITE. "Should the appendix be removed in every case of appendicular abscess."—*Annals of Surgery*, June, 1896.

McBURNEY. "Transactions of the section on general surgery of the College of Physicians of Philadelphia."—*Ibid.*

The writer, after mentioning several points which still admit of legitimate differences of opinion, discusses this question at considerable length. In the cases where the operation is undertaken early, that is before the third or fourth day, there is rarely any doubt about the propriety of removing the appendix, but when we come to the later cases, where a strong wall of adhesions has been formed about the abscess, the case is not so clear.

Some surgeons would remove the appendix in every case, fearing either a return of the disease or a faecal fistula. The views of a number of surgeons are quoted, and all are strongly of the opinion that in certain cases it is not well to disturb things too much, but to be content with draining the abscess cavity, cleansing and packing it with iodoform gauze, rather than run the risk of infecting the general peritoneum by more radical methods. The writer sums up as follows: "Every medical man knows of the inflammatory obliteration of mucous channels, of the retrograde metamorphosis and disappearance of infected sloughs, or of their fibroid transformation into cicatricial tissue; of the shutting in of abscess cavities with infected walls, and of the coincident death of the bacteria therein as the supply of pabulum is cut off; of the spontaneous healing of faecal fistulae. On the other hand, most surgeons of to-day have knowledge of cases in which patients with almost purely local symptoms, in excellent general condition and with distinctly circumscribed abscess, have died of general peritonitis within forty-eight hours after the removal of a deeply-imbedded and adherent appendix."

In the discussion which this paper evoked Dr. McBurney mentioned two classes of abscesses which may be met with as a result of suppuration about the appendix. In one the pus has already approached the anterior abdominal wall and the abscess can be evacuated without opening the general peritoneal cavity. If, in such a case, the appendix forms an integral portion of the barrier which protects the peri-

toneum, no manipulation should be practised. The other form of abscess admits of different treatment. Here the pus and appendix are surrounded by coils of intestine, and the whole mass lies back in the abdomen away from the anterior abdominal wall. Here one must open the general peritoneal cavity as a first step. It is then possible, with gauze or sponges, to isolate the infected area until the mass is unravelled, the appendix removed and the parts cleansed. Every case of suppurative appendicitis is ready for operation as soon as a diagnosis can be made, and the speaker did not agree with Treeves that very few cases required operation before the fifth day. "It is much better to carefully and deliberately approach the abscess than to wait for the abscess to come to the point."

In the course of his paper Dr. White gives the following rules for operation as being such that few, if any, surgeons will dissent from them: "Immediate operation is indicated whenever the onset of a case of appendicitis is marked by both suddenness and severity; whenever, during even a mild attack, the symptoms at the end of twenty-four hours are unrelieved or are growing worse; whenever, in cases seen later, a firm, slowly-forming, well-defined mass is to be felt in the right iliac fossa; whenever at any time a sudden increase in the acuteness of the pain and a rapid diffusion of tenderness occur; whenever there is good reason for believing the appendix infection to be tubercular in character; whenever attacks of any type have been numerous, or are increasing in either number or gravity, or have unfitted the patient for work or activity, or have caused local symptoms which are permanent and persistent or have at any time put the patient's life in great danger." *Robt. C. Kirkpatrick.*

Puncture and Incision of the Pericardium.

DELORME ET MIGNON. "Sur la ponction et l'incision du pericarde"
—*Revue de Chirurgie*, 10 Janvier, 1896.

(Commenced in the April Number.)

In their final article, Delorme and Mignon discuss the results of puncture and incision of the pericardium.

They have collected 102 cases; of these 51 are reported to have died, 36 to have been cured, and in two instances the results are not given by the operators.

They contend, and rightly, that these figures do not truly represent the benefits that may be derived from puncture and incision, as in many of these cases the operation was performed as a last resort, the patient really dying from lesions developed before the operation was

performed. They urge that if it can be shown that puncture and incision of the pericardium are sometimes followed by cure and always by amelioration of the symptoms, that they have gained their cause. They report one case where death was undoubtedly caused by the operation. The trocar had been forced through the left 4th interspace, close to the sternum. The operator withdrew two ounces of blood; five minutes afterwards the patient died from hæmorrhage into the pericardium. The autopsy showed that the trocar had penetrated the right ventricle of the heart on the middle of its anterior surface.

In a few instances a fluid, sero-sanguinolent at the time of operation, became purulent afterwards. This may have been due to dirty instruments and imperfect technique.

Many of the unfortunate results are avoidable.

Patients bear the operation well.

Of 100 cases, 82 were punctures and 18 incisions. Of the 82 punctures 54 died and 28 recovered, a mortality of 65 p.c. Of the 18 incisions 7 died and 11 recovered, or a mortality of 38 p.c.

These figures speak strongly in favour of incision as compared with puncture.

These articles are of great value and are well illustrated, and they lead one to think that there is a legitimate field here for the surgeon to step in and do useful work.

Geo. E. Armstrong.

Gynaecology.

Anterior Colpotomy.

The latest operation to cause much discussion in gynaecological circles is anterior colpotomy, or opening of the abdomen through the anterior fornix, and it is meeting with much adverse criticism from the upholders of ventro-fixation and Alexander's operation.

Anterior colpotomy was brought to the notice of the English-speaking medical world, chiefly, by Martin, of Berlin, at the meeting of the British Medical Association, which was held in London last year. Upon that occasion he reported 109 cases in which he had opened, with good results, the abdominal cavity through the anterior vaginal fornix for various conditions, such as : 1. Myomectomy ; 2. Fixation of retroflexed uteri unless where very adherent ; 3. Procidencia, here combining colporrhaphy with anterior colpotomy ; 4. Cystic ovarian tumours ; 5. Diseases of the tubes.

Martin was first led to adopt the operation by Dührssen, who makes a vertical incision through the anterior vaginal wall from near the tip of the cervix to within about one inch of the meatus urinarius. The bladder is separated and the utero-vesical pouch opened up by forceps, this opening being enlarged by the fingers. The uterus is antverted by Orthman's instrument, a combination of probe and volsellum, and interrupted sutures of stout juniper catgut are passed through the edges of the vaginal wound and the fundus. These are tied and the edges of the wound are further approximated by a continuous catgut suture. The advantages claimed for this operation are : 1. It is almost bloodless ; 2. Short convalescence, the patient getting up on the twelfth day ; 3. No local treatment is required ; 4. There is no feverish reaction.

In two cases seen by the writer, one being operated on by himself, there was practically no post-operative disturbance whatever and the immediate result of the operation was good.

Mackenroh has modified this operation by making a transverse incision in the vaginal wall, but has entirely abandoned it on account of the frequency of complications in pregnancies following the operation. He now stitches the uterus to the bladder, claiming that you thus allow of normal mobility of the organ, but he says nothing of

the irritable bladder which one would expect to have as a result of pressure of the uterus upon that viscus.

Merkel (*Der Frauenarzt*, March, 1896) prefers ventro-fixation to vagino-fixation in cases where the abdomen has to be opened for other conditions, and also in virgins, thus showing that he has no fear of the operation causing complications of pregnancy. He says, however, that "Dührssen's vagino-fixation is to be practised in retro-flexion in women with a wide vagina where other plastic procedures are needed at the same time. Colporrhaphy, excision of the portio-vaginalis, or perineoplasty are often called for in such cases where vagino-fixation is necessary."

Taylor (*British Medical Journal*, Vol. I., 1896) considers vagino-fixation of a retro-flexed or verted uterus to be a more difficult operation than ventro-fixation, but thinks it is of distinct advantage to the patient, as she recovers "more quickly, more simply, more surely and less painfully after vaginal section than after abdominal incision."

Gottschalk (*Cent. f. Gyn.*, No. LII., 1895) reports a death from pulmonary embolism on the seventeenth day after hysteropexy, the patient getting up contrary to orders, but this is no argument against the operation.

Gaubaroff (*Arch. de Tox. et de Gyn.*, November, 1895) reports a case of pregnancy after hysteropexy. The cervix was so high up and pointed so directly backwards that the child had to be delivered by cæsarean section. (The sutures were probably introduced too far down on the posterior surface of the uterus.)

Miländer (*Zeitsch. f. Geb. Gyn.*, January, 1896) reports 74 cases of pregnancy following hysteropexy. Of these 54 went to term and 10 were still pregnant when the report was published. Six aborted and in three labour was premature. Eleven of the full term cases required some form of obstetric aid.

Alexander's operation has lately been championed before the New York Obstetrical Society by Dr. F. W. Johnson, of Boston. In 240 cases operated on by himself, he only once failed to find the ligament, and as this exception was among his earlier cases he attributed this failure to lack of experience. He had two deaths, one from septic peritonitis and one from pneumonia. Twelve of his own cases were delivered at term and the uterus resumed its normal position afterwards. The vast majority of the cases quoted by the author as occurring in the practice of other operators show equally good results. The operation appears to be in high favour in Boston, as 583 cases are reported, divided among nine operators, with a mortality of three. Among his own cases Johnson had two hernias, both of which were

controlled by trusses. Cystitis followed many of his operations, whether a catheter had been employed or not. He says that supuration in the wound is not dangerous if the pus is let out early, nor does it affect the retention of the uterus in its normal position. He reports 90 per cent. of anatomical cures.

In the discussion which followed Johnson's paper, Dr. H. N. Vineberg stated that he himself had seen three or four cases of hernia following Alexander's operation, while Dr. De Garmo and Dr. Coley had observed twelve and nine cases respectively, and all within the last two years.

F. A. L. Lockhart.

Pathology.

Amyloid Degeneration.

CZERNY. AD. "Zur Kenntniss der glykogenen und amyloiden Entartung."—*Arch. f. exp. Pathol. u. Pharmacol.*, XXXI, 1893, p. 190.

CZERNY. "Über die an Thieren Experimentell hervorgerufene Amyloidentartung."—*Ctbl. f. Pathol.*, VII., 1896, p. 282.

LUBARSCH, C. "Beiträge zur Histologie der von Nebennierenkeimen ausgehenden Nierengeschwulste."—*Virch. Arch.*, Vol. 135, 1894, p. 149.

KRAWKOW. "Ueber bei Thieren Experimentell hervorgerufenes Amyloid."—*Ctbl. f. Pathol.*, VI., 1895, p. 337.

While our knowledge of the causes of diseases and of the nature of morbid processes has of late advanced by leaps and bounds in certain directions, in others it has been for years at a practical and painful standstill. I speak feelingly. There is a keen pleasure as a lecturer in pouring out the *εὐαγγελιόν* of new knowledge gained in connection with this or that condition, of clearer conception of its nature and of successful treatment of the same. It is far otherwise when having racked original authorities in the hopes of gaining new light upon some special branch, the truth is forced upon one that so far as regards essential facts one has attained nothing fresh and nothing new, beyond what one knew as a student, and that hearers will find the whole gist of an hour's lecture excellently arranged, with no important point unrecorded, in one page or less of Delafield and Prudden. One might as well be a routine lecturer upon the first book of Cæsar or Euclid at some select academy for young gentlemen for all the stimulating effect that lecturing thus exerts upon the lecturer. It may be that there is—doubtless there is—a virtue in the lucid exposition of facts; it may be that the mind can become attuned to, nay, can experience a certain sublime edification in the recital, year after year, of the same precise items of information. There have, for example, been many virtuous teachers of anatomy. But I have noticed that even good anatomists rise to a higher pitch of enthusiasm over some newly described innervation of the extensor minimi digiti or accessory few fibres of that most useful muscle the *triangularis sterni*, than over,

say, the boundaries of Scarpa's triangle or the course and divisions of the ulnar artery.

Perhaps the modern pathologist is being spoiled by the very embarrassment of riches, and ought to appreciate more highly the yearly round and common task of enunciating the little that is known, and that little unsatisfactory, concerning sundry branches of his subject, and others may not appreciate his felicity when at last some small advances are announced in the same. There are, for instance, the regressive metamorphoses of tissues. We know sadly little about them beyond the mere facts that certain abnormal conditions of the system at large are apt to induce now this now that form. What are the conditions leading to the various degenerations have been carefully noted. What tissues are especially liable to be affected by each degeneration are copied in detail from one text-book into the other; but when we come to enquire why this or that degeneration manifests itself we in almost every instance enter into the realm of theory.

To select one example, amyloid or lardaceous degeneration. We all know that this is especially liable to supervene upon long-continued drain upon the system, that it shows itself most frequently after prolonged suppurative disease—cold abscesses, tuberculous fistulæ, chronic ulcerative phthisis, and less frequently in association with ulcerative cancers, advanced syphilitic lesions, leukæmia—and again after long-continued discharges, and even in some cases after prolonged lactation. We all know that it shows itself most frequently in the spleen, and next most frequently in the liver and kidneys (though we do not know, and the student was in error who ventured the information, that it produced the "tapioca kidney"). We know that the amyloid substance is laid down especially in the walls of small arteries and in basement membrane and affords characteristic reactions with iodine and the basic aniline dyes. But how it comes to pass that this substance is developed and laid down and what is its nature, these are matters concerning which we know but little more than was determined by Virchow and the earlier observers.

It is true that as regards its nature some little advance has been made—it has been shown that Virchow was wrong in comparing it with the starches and terming it amyloid, and that as Hamilton shows the reaction with iodine and weak sulphuric acid which led Virchow to this conception of its relationship is uncertain, and can be given by other substances, such as cholesterine, which is often present as an admixture. Kuhne and Rudneff, by taking advantage of the fact that it is singularly resistant and is not digested by the gastric juice, have been able to gain it in a relatively

pure state, and have assigned to it a provisional formula, which so far as it can be accepted leads to the conclusion that if it is not a proteid, it consists of a combination of proteid with possibly some carbohydrate substance. But at best the foundations for such conclusions are insecure. Similarly that amyloid and hyaline matters are animal gums—compounds of proteid and carbohydrate, analogous to the products of tissue metamorphosis in plants, the vegetable gums—while suggestive, remains “non-proven.” Nevertheless the recent work to which I have referred all points in the direction of these hypotheses.

In the first place it has been found possible to reproduce amyloid disease experimentally. In the course of other researches Frisch noted that very occasionally (4 times out of 300 cases) there might be amyloid degeneration accompanying or following the keratitis induced by inoculation of anthrax into the rabbit's eye, and Bouchard and Charrin, in the course of their studies upon the *B. pyocyaneus*, found similarly that when chronic disease in rabbits was set up by inoculations with this microbe, there might be a development of amyloid degeneration in the kidney and various organs. Now Krawkow demonstrates that repeated inoculations of the main microbe of suppuration—the *pyococcus aureus*—into the rabbit leads in 66 per cent. of the animals employed, to an extensive amyloid condition of the spleen—a less extensive disturbance of other organs. In the hen also the same results may be obtained. In the rabbit, beginning with small doses of the pure culture he obtained local abscess formations, and as the animals recovered from the immediate effects, farther doses were given. As will be readily comprehended by those who have studied the production of immunity, he found that the successive doses had to be successively increased so as to produce effects until at last as much as 30 ccm. of pure broth cultures were necessary. As a consequence the animals become more and more emaciated and eventually died. The amyloid change could at times be found as early as the eleventh day. In fowls apparently there was not the same degree of emaciation, and amyloid change was only found in from six weeks to two months.

But previous to the publication of Krawkow's results, Czerny had already experimentally produced the degeneration by another method, namely, by subcutaneous injections of turpentine. It is a well-known fact that turpentine, nitrate of silver and sundry other substances are capable of producing in the dog an aseptic abscess formation, and Czerny by repeated hypodermic injections extending over from three to seven months, caused the development of the degeneration in five cases.

Experimentally, therefore, conditions which induce pus formation can be shown to induce also the lesions characteristic of amyloid degeneration.

This is in itself an advance, but Czerny was led to his results by a very interesting path which seems to open up further knowledge of this obscure degeneration, namely he was led to make these observations in the course of a research upon glycogen formation.

It is now a matter of common knowledge that pus cells contain glycogen—or if not glycogen, a precursor of the same, which gives the micro-chemical tests for glycogen, while, chemically, glycogen itself can be obtained from pus. There are slight but important differences between the globules or granules seen in the pus cells and the chemically pure substance.

Czerny showed that while glycogen was present in the healthy blood, it is not recognisable by micro-chemical methods, either in a free state or in the white corpuscles. It is, however, to be recognized by such methods in suppurative disease, and indeed in several conditions, notably in cases of atrophic disturbance, progressive anæmia, chronic gastro-enteritis and cachexia of various types. In such cases the circulating leucocytes to a greater or less degree contain granules which take on a brown stain with iodine, and they are also increased in number.

He found that he could induce the conditions experimentally in the dog in several ways, by lowering its temperature, by severe respiratory disturbance (unilateral pneumothorax) or severe anæmia (blood letting) or again by subcutaneous injections of turpentine. It was this last experiment that led him to the study of amyloid degeneration.

It is worthy of note that there is a certain amount of correspondence between amyloid material and glycogen so far as concerns the chemical tests. Both react towards solutions of iodine, being turned brown. Now the granules seen in the blood and pus corpuscles react in a manner intermediate between these two substances. They give the common iodine test, as with glycogen the brown colour with iodine disappears on heating, to reappear again on cooling, and under the action of the salivary ferment the granules disappear, being converted to a sugar just as glycogen is under similar conditions. But then they resemble amyloid in the fact that Virchow's test with iodine followed by weak sulphuric acid leads to the production of a blue colour. Here then in these intra-cellular granules, it seemed as though the long sought precursor of the amyloid material might be present—and continuing his researches with the method which gave him the best results, Czerny, as I have already stated, showed that

injections of turpentine, which at first led to the development of these intracellular granules, eventually induced the amyloid deposits in the spleen and elsewhere.

In the kidney of the hibernating frog Lubarsch has noted a similar intermediate body; certain interstitial cells containing granules staining with iodine and dissolved by the saliva, which nevertheless give the amyloid gentian test. There appears to be a series of transition forms between the glycogen and the amyloid bodies.

Judged by micro-chemical tests it is evident that amyloid material is of inconstant composition. Years ago von Recklinghausen pointed out that the corpora amylacea are more closely allied in their reactions to glycogen than to amyloid material proper. Furbringer and Hansemann have indicated that there are amyloid substances which do not react to iodine, and Krawkow shows that though the extensive enlargement and degeneration of the rabbit's spleen is due to the presence of undoubted amyloid (which can be isolated by peptic digestion), the reaction with iodine is singularly weak.

These researches, therefore, would seem to lead us to the following conclusions:

1. That chemically pure glycogen added to blood and the glycogen present in healthy blood, give no definite reaction with iodine.

2. That in atrophic conditions, and severe anæmia, the circulating leucocytes, and in cases of suppurative diseases, both pus and circulating leucocytes, contain a substance which gives the reactions for glycogen, and from which glycogen can be obtained, but which also appears to be intermediate between glycogen and amyloid material.

3. That conditions characterized by the presence of leucocytes containing this substance can experimentally be shown to lead to amyloid degeneration of the tissues.

4. That according to the results of micro-chemical reaction amyloid material is not of uniform composition. There would indeed seem to be a series of bodies, with pure glycogen at one end of the series, and amyloid, if not hyaline, material at the other. (I shall proceed a little later to speak of hyaline.)

But accepting these views we are not by any means out of the wood. Glycogen is a carbohydrate; amyloid, judging from Kuhne's analysis, if not a proteid, contains a preponderance of proteid material. Neither Czerny, nor Lubarsch nor Krawkow attempt to describe this aspect of the case. Granting that the observations of the first two are correct and—what cannot yet be accepted as more than probable—that there is a relationship between the two substances, we are, I take it, bound to assume that amyloid and amyloid degeneration is due to

an absorption or infiltration of certain tissues—the middle coats of arteries, adventitia of capillaries and basement membranes—with the glycogen-like substance which in this process becomes intimately associated with the pre-existing proteid matter of these tissues, and the compound, or compounds, so formed are the amyloid substances of disease. Now, as I have already stated, those working along other lines (Klebs) have come to a somewhat similar conclusion, namely, that amyloid is a compound of proteid and carbohydrate substances.

Thus these similar conclusions reached by different methods support Czerny's views and tend to show that amyloid is a later stage of glycogenous degeneration.

It would seem that there is a series of degenerations due to the formation of these compounds of proteid and carbohydrate bodies—mucin, amyloid and hyalin. Landwehr has indicated that mucin is of this nature, and between hyalin and amyloid material there are frequent transitions. At times these two are found in the same subject and indeed in the same organ and same parts of an organ; indeed in some cases it appears that the one substance undergoes transformation into the other. But here we enter more doubtful territory. Nevertheless, advance in our knowledge of these degenerations seems to be possible along the lines of work undertaken by these observers.

J. G. Adami.

Reviews and Notices of Books.

The American Text-Book of Medicine and Surgery; being a Yearly Digest of Scientific Progress, and Authoritative Opinion in all branches of Medicine and Surgery, drawn from Journals, Monographs, and Text-books of the leading American and Foreign Authors and Investigators. Collected and arranged with critical editorial comments by several of the leading American authorities, under the general editorial charge of GEO. M. GOULD, M.D. Profusely illustrated. Philadelphia: W. B. Saunders. 1896.

This large and handsomely illustrated volume will, we believe, prove to be a work of much practical value, not only to the general physician, but also to the specialist. Containing much more material than most of the annuals, it affords a useful epitome of all important contributions which have been made to medical knowledge during the past year.

Under the editorship of Dr. Gould, a very able staff of collaborators has been secured, and a successful effort has been made to review only those papers, which are or may be contributory to actual progress. New facts and new methods of treatment receive a careful critical notice from the editors of the several departments. Among the list of editors we notice the names of Pepper, Keen, Hirst, Baldy, Louis Starr, Hardaway, Gibney, Barnett, Ingals and Guitéras—names that sufficiently attest the high character of their several articles.

We have made use of this volume frequently during the past few weeks, and have been much pleased not only with the matter which it contains, but also with its arrangement. We believe that such works as this fill a very definite want in the physician's library, which the bound volumes of no ordinary series of weekly or monthly journals can do. A. D. B.

A Treatise on the Medical and Surgical Diseases of Infancy and Childhood. By J. LEWIS SMITH, M.D., Professor of Diseases of Children, Bellevue Hospital Medical College. Eighth edition, thoroughly revised and greatly enlarged. 273 illustrations and 4 plates. Messrs. Lea Bros. & Co., New York and Philadelphia.

We have much pleasure in calling attention to the eighth edition of this well-known treatise on Diseases of Children. The work has been thoroughly revised, and a great portion of it rewritten. Eight additional chapters have been added, relating chiefly to Surgical Pediatrics. These have in great part been written by Prof. Stephen Smith. Prof. O'Dwyer contributes the chapter on Intubation.

This text-book has for many years retained its position as an authori-

tative exponent of American teaching in this department of medicine. We, therefore, gladly welcome the new edition, which enables it to still keep abreast of its many competitors, and can cordially recommend it to the young practitioners, as embodying the latest opinions of a most careful and practical teacher, whom we all regard with respect and admiration, as in some respects the father of American Pediatrics. A. D. B.

A Manual of the Practice of Medicine. By GEORGE ROE LOCKWOOD, M.D. With 75 illustrations in the text, and 22 full page coloured plates. Saunders New Aid Series. W. B. Saunders, Philadelphia, 1896. Price, \$2.50 net.

We have read over this manual carefully and regard it as a very excellent work of its class. Symptoms are stated fully and succinctly. The temperature charts are numerous and the illustrations excellent. We have much pleasure in recommending the book, not only to students, but to physicians who desire to have a work in which the essential facts and principles of the practice of medicine are stated in a concise and available form. A. D. B.

Ruhmkorf Induction Coils, their Construction, Operation and Application. By H. S. NORRIE. Pp. 183. Price, 50 cents. New York: Spon & Chamberlain, 12 Cortlandt Street.

A book of this kind will be appreciated at the present when so much interest is displayed in the discoveries of Roentgen and others.

It is a practical work, giving the details of coil construction and the effects of the current, especially *in vacuo*. Chapters on primary and storage batteries are added, and the last chapter is devoted to the Roentgen rays.

The work is what it professes to be, a practical hand-book on induction coils, and as such we recommend it. R. C. K.

A Hand-Book of Medical Diagnosis. By JAMES B. HERRICK, M.D. Philadelphia: Lea Brothers & Co. 1895.

This book, as its preface indicates, is intended chiefly for students, and the aim has been to bring together the main facts in diagnosis, chemical, bacteriological and microscopical, as well as the general principles of physical examination.

We would suggest that the facts are compressed in too small a space, and hence the volume cannot but fail to satisfy any other than the incipient medical student. To those who for the first year visit the dispensaries and out-patient hospital rooms the book certainly commends itself, supplying, as it does, the typical general considerations of diagnosis. For the more advanced students, however, it lacks the breadth of compass and the detail found in many of the more voluminous books of a similar character, and which are absolutely essential in view of the fact that so few cases are, after all, text-book types. Some of the chemical tests now

employed clinically are quite unjustly disregarded—such for example as Huppert's test for bile pigments, while Rosenbach's modification of Gmelin's test is best performed by the use of *nitrous*, not nitric acid, as given.

In the chapter on urinalysis it is suggested that it is important to differentiate between cells from the kidney and those from the urinary bladder, but the distinguishing features are not dealt with.

Setting aside, however, many slight inaccuracies and deficiencies it may be said that the general plan of the work is good, the plates are well selected, and the style admirable.

It is recommended to junior students, to whom larger books would no doubt at such a time be burdensome.

C. F. M.

An Introduction to Pathology and Morbid Anatomy. By T. HENRY GREEN, M.D., F.R.C.P. Seventh American edition, revised and enlarged by H. M. Murray, F.R.C.P. Philadelphia: Lea Brothers & Co. 1895.

It is now more than six years since the above work has passed through a new edition, and the present volume is an effort to bridge over the long period by addition of the main results of recent pathological research. The general plan of the book as previously published, has been maintained, and the more recent advances are to some extent satisfactorily dealt with. The effort is made to include some of the most important bacteriological discoveries, but the subject of immunity is lamentably deficient. Such names as Kanthack and Hardy, Buchner, Hankin, Roux are either entirely disregarded or their work is but casually mentioned. Instead of associating the subject of inflammation with that of immunity, the same lines are maintained as in the older work, in spite of all that Metchnikoff and others have done to change entirely the aspect of this important chapter in Pathology.

Many new excellent plates have been added, and considering that the book purports merely to be an introduction, the portions devoted to morbid anatomy are concisely put and comprehensive.

C. F. M.

The Toxic Amblyopias; their Classification, History, Symptoms, Pathology and Treatment. Being an essay to which was awarded the Alvarenga prize of the College of Physicians of Philadelphia, October, 1894, By G. E. de Schweinitz, A.M., M.D. Forty-six illustrations and nine plates. Philadelphia: Lea Brothers & Co 1896.

This work of Dr. G. E. de Schweinitz, of Philadelphia, is for the most part an elaborate *resumé* of our knowledge up to the present time of the toxic amblyopias.

The subject is well handled and classified, and consequently the study of it is much facilitated.

The original work of the author forms but a limited part of the whole, yet is valuable as far as it goes.

More especially does this hold true of his researches in regard to the toxic eye symptoms of quinine, which are most elaborate.

The amount of quinine which can give rise to toxic symptoms varied from fifteen grains to one ounce in twenty-four hours.

The eye symptoms varied from temporary amblyopia, diminished accommodative power, and semi-dilated pupil to complete blindness; the duration of the blindness varied from a few hours to three months; the fundus changes were pallor of disc, anemia of retina, and sometimes a cherry-coloured spot at the macula, etc. The prognosis is good, there very exceptionally resulting permanent blindness.

The pathological changes noted are the results of the author's experiments on dogs; the details of the experiments are very interesting. The results are: Endovasculitis of the optic nerve vessels; organization of a clot, the result of thrombosis: widening of the infundibulum of the vessels as a result of the constriction of the surrounding nerve fibres, causing appearances not unlike glaucomatous excavation; and finally practically complete atrophy of the visual path, nerve, chiasm and tracts.

The initial effect of the quinine is on the vasomotor centres, producing constriction of the vessels; endovasculitis, thrombosis, etc., resulting.

A curious point is the selective influence of the quinine for the optic nerves and tracts, the adjoining ciliary nerves and oculomotor nerves escaping.

Dr. de Schweinitz also experimented with cinchonine and got similar results, except that larger doses were required.

Salicylate of sodium was also investigated, but further experiments must be undertaken ere final judgment can be given. From what he observed, the author considers it is possible to produce blindness with large doses, the ophthalmoscopic changes resembling those of quinine.

A large portion of the book is taken up by the consideration of the alcoholic and tobacco amblyopias, but little or nothing absolutely new is presented, there remaining still the haziness about the alcoholic cause, as it is almost impossible to eliminate the tobacco factor; still the purely alcoholic cause in some cases seems very probable.

Lastly, Dr. de Schweinitz conducted a series of investigations on the toxic action of *felix mas*, on dogs and rabbits.

In no case was there any fundus change, nor positive signs of blindness as in human beings, nor could any microscopic lesion be made out.

The foregoing paragraphs cover the most of the author's original work.

The compilation of the rest of the book, must have taken much time, and, as stated at the outstart, is well done.

The book will be of value as much to the general practitioner as to the specialist, presenting as it does, in a succinct form, the present status of the subject.

As a work of the publishers it is handsomely bound and beautifully printed, appearing not unlike an edition *de luxe*.

J. W. S.

Society Proceedings.

MONTREAL MEDICO-CHIRURGICAL SOCIETY.

Stated Meeting, April 17th, 1896.

F. G. FINLEY, M.D., FIRST VICE-PRESIDENT, IN THE CHAIR.

Ichthyosis Hystrix.

Dr. G. GORDON CAMPBELL showed a photograph of a remarkable case of this disease. The patient, a boy aged seven years, was born in Vermont, and, except for the discomfort caused by the cutaneous lesion, had always had good health. The family history was negative; one sister, three years of age, showed no tendency to xeroderma. The eruption was first noticed, three weeks after birth, as a thickening of the skin of the palms and soles; and since then, although there had been marked improvement at times, the boy had never been entirely free from it. The distribution was accurately symmetrical and the intermediate skin perfectly healthy. The palmar surfaces of the hands from the wrist to the tips of the fingers were covered with dark-green horny masses, half an inch in height, and so thickly set together that it was impossible to close the hand. Less prominent warty growths extended on to the backs of the hands, forming a bracelet around the wrist and covering the knuckles and backs of the fingers. The whole of the feet from the ankles down were covered with similar horny growths, thickest upon the soles, and rendering any movement of the instep or toes impossible, except after softening with some oily application. There were also small patches, about two inches in length and half an inch in width, running vertically at the anterior axillary lines and the groins; broad patches on the extensor surfaces of the knees and elbows; and one surrounding the anus and following the fold between the buttocks. The horny growths in these latter localities were not nearly so prominent. Owing to the apparent increase in the size of the extremities, due to the hoaping up of epidermis, the condition had been mistaken for elephantiasis.

Foaming Liver.

Dr. J. G. ADAMI showed specimens of a case, a report of which will be published later.

Dr. C. F. MARTIN recalled two instances of a condition somewhat similar to that described by Dr. Adami. In one, at a *post-*

mortem which he had seen performed in Vienna, the mucus membrane of the urinary bladder had been almost entirely lifted by the emphysema. The *B. coli communis* was suspected, though no bacteriological examination had been made. In the other, a case of septicæmia from streptococcus infection, occurring in this city, a large portion of the ileum presented the same emphysematous appearance. He thought that these two conditions, although not recognized at the time, were probably due to the same cause.

Adhesions and Malpositions of the Omentum.

Dr. J. G. ADAMI read a paper on this subject, which will be published later.

Dr. H. A. LAFLEUR asked how Dr. Adami could harmonize with his theory the fact that in typhoid fever, in which perhaps more frequently than in any other abdominal disease death threatened from perforation of the bowel, omental adhesions were so seldom found. He had yet to see a case of typhoid fever with perforation in which such adhesions had formed. In appendicitis omental adhesions were common, and in dysentery adhesions between the coils of the bowel were not infrequent.

Dr. N. D. GUNN asked if when fat was laid down in the omentum there was a corresponding increase in the capillaries; if not, then Dr. Adami's statement concerning the vascularity of adipose tissue was disproved. Also, that the presence of much fat in the omentum would greatly interfere with the elasticity which, according to Dr. Adami, was necessary to the protective function which he suggested.

Dr. F. A. L. LOCKHART thought that the paper was of as great interest to the abdominal surgeon as to the pathologist, from the important part played in surgery by the omentum in preventing adhesion of the intestines to the abdominal wall. He referred to a case in which the intestine had become adherent in two places to the line of incision, and through the loop thus formed a coil of intestine had passed, and caused obstruction. This would not have occurred if the omentum had been drawn down at the previous operation. The extreme variations in the size of the omentum referred to by Dr. Adami he had frequently observed. That a long and adherent omentum might complicate diagnosis and operation in abdominal work, the following two cases clearly show. He operated, two years ago, on a patient who had double pus tubes, and, on opening the abdomen, had found that the intestines were covered in by a long omentum, which was adherent to the anterior part of the pelvic brim, and which had to be ligatured and divided in order to get at the diseased tubes.

The second case was a dermoid of the right ovary, which was held in the vesico-uterine pouch by the right tube and broad ligament on the one side, and by the omentum, which was adherent to the left side of the tumour and extended to the left pelvic brim, where it was also attached. He had frequently remarked the fact that there was less hæmorrhage from an abdominal wound in a fat person than in one who had thin parietes.

Dr. WESLEY MILLS had long held, and often expressed, the view that the study of physiology should not be confined to those who were physiologists by profession, but that everyone connected with the medical profession should endeavour to do something to throw light upon the function of parts in health as well as in disease. He referred to the scant notice taken of the omentum in text-books and discussed some of the probable uses of the organ. He also pointed out the importance of both the circular and longitudinal muscle supply in arteries as elastic structures that often served a good purpose when the elastic tissue proper had been impaired by disease.

Cerebellar Ataxia.

Dr. N. D. GUNN reported the following case of a boy, aged 12 years of normal somatic development, sluggish cerebration and psychic perversions.

Family history was good, and no hereditary or familial diseases could be traced. The doctor was consulted because of inability to control movements of the legs, spasmodic incontinence of urine, and great pain in the head. Besides these there was violence of temper and sexual excitement.

The incoördination began two months after an injury to the head, which perhaps was only incidental. Besides at this time there were diplopia, vertigo, headache and cerebral vomiting, the latter lasting two months.

Examination revealed static ataxia, with inclination of the body to the right side. Speech deliberate and monotonous. Inability to stand without support. Incoördination of arms. Muscular power good. Muscular irritability increased. Deep reflexes increased. (Patellar greatly exaggerated, and very slight clonus.)

There was no nystagmus, but there was a choroiditis.

The doctor, on the authority of Brissand, considered the presence of exaggerated reflexes enough to exclude spinal ataxia.

The presence of ankle clonus and the disturbances of the higher centres, shown by diplopia, cerebral vomiting, static ataxia and zig-zag incoördination, and the absence of nystagmus, made this case

conform pretty closely with Marie's group known as "hereditary cerebellar ataxia," though the element of heredity was here absent.

Dr. JAMES STEWART referred to a very similar case, with, however, a history of ataxia preceding the injury. He thought that it was very difficult to separate cerebellar ataxia from Friedreich's ataxia.

Stated Meeting, May 1st, 1896.

A. D. BLACKADER, M.D., PRESIDENT, IN THE CHAIR.

Excision of the Maxilla with the Use of an Artificial Plate.

Dr. G. E. ARMSTRONG reported this case as follows: Mr. W., æt. 48, was admitted to the Montreal General Hospital on the 5th March, suffering from a rapidly growing sarcoma, situated chiefly in the anterior of the left superior maxilla. There was nothing unusual about the operation of removal of the upper jaw, which was done by the median incision, but I have brought him here this evening to show the plate which Dr. J. S. Ibbotson, the dentist to the Montreal General Hospital, has made for him. You will see, by examining him, that it consists of an upright plate, which restores the form of the cheek, and a horizontal part, which takes the place of the absent hard palate on the affected side. He seems to wear it with comfort, and when it is in place he can eat, drink, and speak very well. It seems to be a decided success.

The Tropometer.

Dr. F. BULLER showed the instrument and demonstrated its use.

Primary Cancer of the Urinary Bladder associated with Stone.

Dr. W. H. JAMIESON reported the case, which will appear latter.

Dr. J. G. ADAMI pointed out the very extensive study and attention that Dr. Jamieson had given to this case. It was worth so much study, inasmuch as primary cancer of the bladder was so very rare, more especially when associated with stone. He recalled a case that he had brought before the society in 1893, in which also he was dealing with cancer of the bladder; but in this case the cancer was primary in the prostate. In that also there was great difficulty in following out the cancerous manifestation, from the fact that the growth in the bladder-wall became so cellular as to be scarcely distinguishable from a round-celled sarcoma.

Cyanide of Potassium Poisoning.

Dr. WYATT JOHNSTON showed the organs from a case, and described the methods used in detecting the toxic agent.

Dr. ADAMI remarked that Dr. Johnston's case, with his demonstra-

tion of the so easily recognizable odour of potassium cyanide so many days after the death of the individual, recalled vividly to his mind his experiments upon dogs, undertaken in connection with the Hooper case, in which he found that the cyanide could readily be detected eleven days after death. At the same time he pointed out how peculiarly volatile is this poison, for within a few seconds, in fact, almost immediately after Dr. Wyatt Johnston had opened the bottles containing his specimens, he and those around him had no difficulty in recognizing the well-known odour. But he fully felt the force of what Dr. Johnston had said, namely, that those unaccustomed to the autopsy smell might easily, at a *post-mortem* examination, be overwhelmed by that smell, and fail to recognize or analyse the conjoined odour of potassium cyanide.

Dr. C. G. L. WOLF said that the tests for the detection of hydrocyanic acid at the *post-mortem* table were highly sensitive and at the same time easy of performance. There were two, the potassium sulphocyanide test, and the obtaining of Prussian blue. In the first test one allowed the gas escaping from the stomach on opening to impinge against a paper moistened with yellow ammonium sulphide. On driving off the excess of sulphide by gentle heat over a flame, and touching the spot with a dilute solution of ferric chloride, the splendid blood-red colour of ferric sulphocyanide appeared.

In the second a filter paper moistened with potassium hydrate solution was exposed to the gas, and then moistened with a solution of ferrous sulphate, by which one obtained potassium ferrocyanide. It was then treated with dilute hydrochloric acid and a solution of ferric chloride, when, if hydrocyanic acid was present, Prussian blue was formed.

It was interesting to note that in the sample of powder which had been examined, and which was probably part of the potassium cyanide used, no trace of hydrocyanic acid was found, as by the action of the air it had been changed to potassium carbonate.

The sample used in this case had been an ordinary impure cyanide, containing originally a large quantity of sodium cyanide.

Fracture of the Skull.

Dr. WYATT JOHNSTON showed a skull sent to him by Dr. Austin, of Sherbrooke, in which a fracture had been caused by a blow of the fist on the side of the head. Death occurred about twenty-four hours later from meningeal hæmorrhage. The case will be reported in full.

Dr. A. L. DEMARTIGNY referred to a similar case which had come under his notice. A beer drinker had been struck on the head with a bottle and fell down, but a few minutes later walked home, saying

he was all right. Four hours afterwards he went to sleep and never woke again, dying within twenty-four hours after the injury. The autopsy showed the same sort of fracture of the skull as seen in Dr. Austin's case.

The Brain and Skull of a Criminal.

Dr. WYATT JOHNSTON showed the skull and brain of a criminal from Longue Pointe Asylum, and Dr. GEORGES VILLENEUVE gave the clinical history of the case, a report of which will be published later.

Tubal Pregnancy.

Dr. A. LAPHORN SMITH read the following report :

The following notes of the case are taken from the records of the Samaritan Hospital for women, as reported by Dr. Fiske, the Registrar. Mrs. R., age 38, was admitted on the 3rd of March, 1896, complaining of pain over the abdomen and in the back and of metrorrhagia, both of which had lasted five weeks.

Previous history, never been very strong ; has been married nine years ; had no children, but has had five abortions at about seven weeks of pregnancy, the last one in January, 1895, from which she made a good recovery. Nearly nine years ago, Dr. William Gardner removed a polypus from her womb. Three years ago she was curetted by Dr. Laphorn Smith who wished to perform abdominal section for disease of the ovaries and tubes and retroversion with fixation. This latter she declined and was treated locally for a year, at the end of which time the condition of the pelvic organs had considerably improved, the uterus becoming fairly movable and the ovaries ceasing to cause much pain. She was then treated for a year with pessaries which kept her comfortable.

History of present illness—Had her period in last week of December, after which she saw nothing until the last week of January, when she began to flow and has continued doing so on and off for five weeks. About a week before admission she was taken with inflammation of the bowels and Dr. Ayles was called in. As she was losing a good deal and suffering a great deal of pain and was moreover seriously ill with pelvic peritonitis, he advised her to enter the hospital for prompt operative treatment.

Present condition—Patient very emaciated, anxious expression, abdomen tender and distended ; nausea and vomiting ; pulse, 130 ; tongue clean, appetite poor. Heart, lungs, liver and spleen normal. A vaginal examination shows the uterus to be retroverted and fixed, with a tumour the size of an orange in the left ovarian region. Right tube enlarged to the size of a sausage and tender.

A diagnosis of tubal pregnancy was made, being based upon the following symptoms: First she believed herself pregnant since her December period, because she has morning sickness, pain in the breasts and fulness of the abdomen. Second, I was aware from my previous knowledge of her case that she had diseased tubes and that it would be difficult for the ovum to reach the uterus. Third, that a mass could be felt in the vaginal lateral cul-de-sac, which was causing pelvic peritonitis, and which could hardly be anything else than a pus tube or a ruptured tubal pregnancy. Fourth, the continuous hæmorrhage, coupled with the previous symptoms.

Abdominal section was performed on March 10. On entering the peritoneal cavity, the pelvis was found pretty full of black clotted blood, of which about a cupful was removed, after which the left tube and ovary forming a mass the size of an orange was detached with some difficulty from its adhesions. While bringing it out of the incision the sac ruptured and a perfectly formed fœtus, about three inches long, escaped with the gush of fluid and hung by the cord. After removing this tube the other tube and ovary were detached with some difficulty and removed. The latter tube was found to be closed at both ends and full of clear fluid. About twenty minutes were spent in cleaning out the clots which were firmly attached to the omentum and intestines, and after sewing the uterus to the abdominal wall, the latter was closed with silk worm gut. The patient made a smooth recovery and left the Samaritan at the end of four weeks.

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THE CANADIAN MEDICAL ASSOCIATION.

The Canadian Medical Association will hold its meeting in this city on Wednesday, Thursday and Friday, August 26th, 27th and 28th. It promises to be one of the most successful meetings in the history of the Association.

PROGRAMME OF PROCEEDINGS.

Wednesday, August 26th.

10 a.m.—Inter-provincial Registration Committee meeting in St. George's Church school-rooms, 15 Stanley street.

12.30 p.m.—Montreal General Hospital, Clinical Work, followed by the general work of the Association in the operating theatre of the hospital.

4 p.m.—Short excursion.

8.30 p.m.—President's Address in St. George's school-rooms, 15 Stanley street, followed by continuation of papers adjourned from the afternoon meeting.

Thursday, August 27th.

10 a.m.—Meeting in St. George's school-rooms, Reading of Papers.

12.30 p.m.—Hôtel Dieu Hospital, Clinical Work, followed by continuation of papers in the operating theatre of the hospital, adjourned from morning session.

4 p.m.—Short excursion.

7.45 p.m., sharp.—Dinner of the Association.

Friday, August 28th.

10 a.m.—Meeting in St. George's school-rooms, Reading of Papers.

12.30 p.m.—Royal Victoria Hospital Clinical Work, followed by continuation of papers in the lecture room of the hospital adjourned from the morning.

Light lunches will be provided for the members at the hospitals, and special electric cars will be furnished to and from the hospitals.

CERTIFICATES OF DEATH IN MONTREAL.

On July 1st will be put in force the by-law, which was passed on the 18th May last, concerning the certificates of death and the burial of persons dying in the city of Montreal. The main provisions of the by-law are as follows: No body shall be buried within the limits of the city, the only exception being in regard to the interment in the Roman Catholic churches of the bodies of priests and nuns. The superintendent of every cemetery shall make weekly returns of all persons buried therein. Within twenty-four hours after the death of any person within the city limits, a certificate of death, according to a form which is supplied by the Board of Health, must be deposited in the health department, and in the absence of this the coroner shall investigate the cause of death. No body may be brought into the city nor moved from one place to another within the city limits without a permit from the medical health officer. No body may be received at a cemetery without a certificate from the medical health officer stating that the proper certificate of death has been deposited in the health department.

This by-law gives the Board of Health full power to obtain complete and accurate returns of the mortality and remove many of the difficulties under which they have been labouring. As far as the city goes it requires that the cause of every death must be certified by a medical man, or else it is made the subject of an investigation by the coroner. It does away with all giving of certificates by clergymen or by two or three friends.

This is a long step in the right direction, and we hope soon to see compulsory registration of births as well. At present there is a register for births at the City Hall, but it is not compulsory to make use of it, and if a child is not baptised it is not registered, and consequently has no legal existence. Besides we can never have vaccination properly carried out until all births are registered and vaccination certificates given returnable within three months. It has got to come, and the sooner the better.

AMERICAN PUBLIC HEALTH ASSOCIATION.

The twenty-fourth annual meeting of the American Public Health Association will be held at Buffalo, N. Y., September 15 to 18, 1896. The Executive Committee have selected the following topics for consideration: The pollution of water supplies; the disposal of garbage and refuse; animal diseases and animal food; the nomenclature of diseases and forms of statistics; protective inoculations in infectious

diseases; national health legislation; the cause and prevention of diphtheria; causes and prevention of infant mortality; ear sanitation; the prevention of the spread of yellow fever; steamship and steamboat sanitation; the transportation and disposal of the dead; the use of alcoholic drinks from a sanitary standpoint; the centennial of vaccination; the relation of forestry to public health; transportation of diseased tissues by mail; river conservancy boards of supervision.

Upon all the above subjects special committees have been appointed. Papers will be received upon other sanitary and hygienic subjects also.

All communications relating to local matters should be addressed to Dr. Ernest Wendo, Chairman Local Committee of Arrangements, Buffalo, N. Y.

The authorities of Harvard University are protesting against the use of the name Harvard Medical College by a Chicago institution. A bill for an injunction, sworn to by President Eliot of the university, was filed in the Federal Court of that city lately. The Chicago institution is charged with infringing upon the title and the rights of the great university.

The American Microscopical Society will hold its nineteenth annual meeting in the new Carnegie Library Building, Pittsburg, Pa., Tuesday, Wednesday, Thursday and Friday, August 18, 19, 20 and 21, 1896. A hearty welcome will be extended to all interested in the microscopical sciences. Applications for membership and titles of papers to be read at the meeting should be addressed to A. Clifford Mercer, M.D., President, Syracuse, N. Y., or to Wm. C. Krauss, M.D., Secretary, 382 Virginia street, Buffalo, N. Y.

NEW BOOKS, ETC., RECEIVED AND NOTED.

Transactions of the Pan-American Medical Congress. Washington: Government Printing Office.

In Sickness and in Health. Toronto and New York: D. Appleton & Co.

Hydro-electric Methods in Medicine. By W. S. Hedley, M.D. Second edition. London: H. K. Lewis.

Affections chirurgicales du tronc. Par le Dr. Polaillon. Paris: Octave Dion.

Lewis's Diet Charts. London: H. K. Lewis.

Physics for Students in Medicine. By Alfred Daniell, M.A. London: Macmillan & Co. Toronto: Copp. Clark Co.

Practical Points in Nursing. By Emily A. M. Stoney. Philadelphia: W. B. Saunders.

A Manual of Obstetrics. By W. A. Newman Dorland, A.M., M.D. Philadelphia: W. B. Saunders.

Students' Medical Dictionary. By George M. Gould, A.M., M.D. Philadelphia: Blakiston, Son & Co.

Obituary.

ADOLPHE DAGENAI, M.D.

On Monday afternoon, June 29th, Dr. Dagenais succumbed to the painful malady from which he had been suffering. He was sixty years of age and was one of the oldest practitioners in the city, having passed the examination of the College of Physicians and Surgeons in 1858. He obtained degrees from Victoria University in 1867 and Laval in 1879. In 1872, in conjunction with Drs. Rottot and Desrosiers, he founded the "Union Médicale du Canada." He has been professor of obstetrics in Laval University since 1878, and previous to that date he was visiting physician to the Hotel Dieu. He has held the positions both of Secretary and of Treasurer of the College of Physicians and Surgeons of the Province of Quebec, and in 1876 was President of the Société Médicale de Montréal. He leaves a widow and four daughters, one of whom is a nun in the Convent of the Holy Cross. Dr. Dagenais has been for many years a prominent figure in medical circles and has passed away regretted by all. The cause of death was cancer of the tongue, from which he had suffered for many months.