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[No. I.

ORIGINAL ARTICLES.

(No paper published or to be published elsewhere as original, will be accepted in this department.)

ANTI-DIPHThERITIC SERUM.*

By J. J. CASSIDY, M.D., Toronto.

The new method of preventing and curing diphtheria by immunized serum continues to attract the attention of the medical world. Now that the first moments of excitement and admiring infatuation have passed away, scientists have devoted themselves to a calmer and more reflective examination of the subject. As generally occurs in similar cases, a want of confidence and a distinct reaction against antitoxine would now be in order if clinical experience, which goes on ceaselessly recording its observations in different countries, did not support and encourage the somewhat rosy expectations which were first formed of its success.

In Germany, strange to say, the country in which the Klebs-Löffler bacillus was discovered, and in which later on the immunizing serum of Behring was first used with success, the reaction goes so far as to deny the existence of the Klebs-Loeffler bacillus, in order to demonstrate with greater certainty the unreasonableness of Behring's antitoxine.

At a recent meeting of the Berlin Medical Society, Dr. Hansemann read a paper strongly condemnatory of serum therapy. He began by stating that the Loeffler bacillus is not the bacillus of diphtheria as understood in the clinical meaning of the word. It is wanting in 30 per cent. of the

* Read at first quarterly meeting of Provincial Board of Health.

cases, is ever associated with staphylococci and streptococci, and is absent in certain well-defined diphtheritic affections (fibrinous rhinitis, conjunctivitis, etc.). When injected subcutaneously into animals, it provokes a simple œdema of the tissues. When placed in the throat of an animal it does not cause diphtheria if the mucous membrane of the throat is healthy. Animals put in contact with cases of diphtheria do not take the disease. He concludes, therefore, that the Lœffler bacillus cannot produce the diphtheria described and treated by Bretonneau.

Continuing his indictment against serum therapy, Dr. Hansemann states that: 1. According to the promoters of this method of treatment, the cure of the disease is effected by immunization due to the infection itself; 2. Immunization is brought about through the intervention of antitoxines. He contends that the first hypothesis is not yet proved; that with regard to the second, no one has yet seen the antitoxines; and finally, he states that the serum neither immunizes nor cures, and that it is directly injurious by the nephritis which it provokes.

In the discussion which took place after the reading of Dr. Hansemann's paper, Professor Virchow stated that he was quite in accord with the views of his assistant, Dr. Hansemann, in denying any specific value to the Klebs-Lœffler bacillus in the causation of diphtheria. He confessed, however, that the statistics, so far produced, were very favourable to the curative power of the serum. For instance, from about the 15th of March last, Behring's serum had been injected into 303 out of 533 children admitted to the Frederick Hospital for Diphtheria. In the 303 injected children the mortality was 13.5 per cent.; in the 230 who did not receive serum the mortality was 47.82 per cent. Prof. Virchow concluded that Behring's serum is really efficacious, and that every physician ought to use it in spite of certain drawbacks with which it is charged.

Drs. Von Bergmann and Holff supported the specific character of the Klebs-Lœffler bacillus in the causation of diphtheria. The former had tried serum in several cases, but had not yet sufficient data to form a definite opinion. In tracheotomy for all cases, an operation which he had done 2,586 times, his mortality had been 52 per cent. Dr. Körte remarked that the results obtained by serum therapy are much superior to those obtained by the ordinary means of treating diphtheria. Out of thirty-six patients treated for diphtheria, he had lost nine, and three of these were moribund when brought to the hospital. Of the thirty-six, eight only were light cases.

With regard to the albuminuria, resulting from the serum, Dr. Körte admits the soundness of the charge, but he does not consider that a sufficient reason for giving up a treatment which has produced results altogether remarkable in a very serious disease.

The last meeting of the Medical Society of Greifswald, in Germany, was entirely taken up with the consideration of serum therapy in diphtheria. Dr. Börger gave the results of his treatment of thirty patients who had diphtheria,

five of whom had been tracheotomized. He had two deaths, or a mortality of about 7 per cent. In former years, with other plans of treatment, the mean mortality was 14.5 per cent. With regard to the effect of the injections, Dr. Börger noted the improvement of the local conditions in from twelve to twenty-four hours, with lowering of the temperature in from two to four days; albuminuria was pretty frequent, but transient. Dr. Beumer cited two facts in favour of the prophylactic value of the serum. In a family in which five children were attacked with diphtheria, the sixth was treated with serum. He did not take the disease, though continually in contact with his sick brothers. In a boarding school, three pupils caught diphtheria; fourteen others were treated with serum and did not contract the disease.

Dr. Polieuctoff reported to the Society of Pediatrics of Moscow, that he had treated nine cases of diphtheria—two with Aronson's serum and seven with that of Dr. Roux—and lost only one. Professor Filatoff added a tenth case treated successfully by himself.

In England, Dr. Campbell White (*Medical Recorder*, November 17, 1894) gives a report of twenty cases, of which fourteen had croup, requiring tracheotomy in five cases. Aronson's serum was used. The mortality was 25 per cent.—four deaths in fourteen cases of croup, one death in six uncomplicated cases. Among the isolated cases reported in the *British Medical Journal* we notice three cases by Dr. Simpson with two deaths, one case of cure by Dr. Lees, one case of cure by Dr. Christie, and also one successful case by Dr. Phillips.

At a meeting (December 14th) of the London Clinical Society, Dr. Washbourne read a paper showing that out of seventy-two cases of undoubted diphtheria treated by him with serum fourteen died, showing a mortality of 19.44 per cent. Of nine tracheotomized cases three died. Six cases only showed post-diphtheritic paralyses, no instance of which was of a serious character.

Dr. Herringham had used serum in eighteen cases of diphtheria in children ranging from twenty months to two and a half years of age. Seven were light cases, and eleven were serious. All the light cases recovered. In the serious cases tracheotomy was required in ten, and intubation in one. Seven recovered, which is a rather favourable showing when we recollect the serious character of tracheotomy in nurslings.

Dr. Lennox Brown had used serum in five cases. Two children died with symptoms of anuria. In one of the other cases a well-marked oliguria was observed.

A statistical report, compiled by Dr. Peyron, was sent last December to the "Comite Consultatif d'Hygiene," of France, in which he shows the comparative figures of the results obtained before and since the new treatment was begun at the Sick Children's Hospital and the Trousseau Hospital, Paris.

The following table shows the results obtained from the year 1887 to 1893:

DIPHTHERIA.		1887.	1888.	1889.	1890.	1891.	1892.	1893.
Cases	{ Sick Children's Hospital ..	802	874	873	1002	957	997	1015
	{ Trousseau Hospital.....	775	909	1055	1105	946	1073	862
		1577	1783	1928	2107	1903	2070	1877
Deaths....	{ Sick Children's Hospital ..	508	601	569	560	502	475	492
	{ Trousseau Hospital.....	451	552	615	648	519	563	471
		959	1153	1184	1208	1021	1038	963
Mortality per cent. ..	{ Sick Children's Hospital ..	63.34	68.76	65.18	55.81	52.45	47.64	48.47
	{ Trousseau Hospital.....	58.19	60.72	58.28	58.64	54.86	52.47	54.63
Average		60.81	64.66	61.41	57.33	53.65	50.14	51.30

The second table shows the results of the new treatment, which was inaugurated February 1st, 1894, at the Sick Children's Hospital, and on September 18th, at the Trousseau Hospital—results considered at first separately in each of these hospitals, and afterwards in both hospitals taken together.

DIPHTHERIA.	Cases.	Deaths.	Mortality per cent.
Sick Children's Hospital	780	164	21.00
Trousseau Hospital.....	247	39	15.02
Sick Children's Hospital and Trousseau Hospital taken together	1027	203	19.76

In December, Dr. Thistle, Toronto, tried antitoxine obtained from the New York Pasteur Institute, in a case of diphtheria which he was treating at the Victoria Hospital for Sick Children. Intubation had been done previously to relieve a laryngeal stenosis. The patient succumbed twelve hours after the injection of the antitoxine. At the autopsy it was found that false membrane existed, not only in the trachea, but throughout the ramifications of the bronchi.

At the Toronto Isolation Hospital, Dr. Sheard, Medical Health Officer, treated three cases of diphtheria with antitoxine, combined with the treatment usually pursued in such cases. We subjoin a brief summary of each case:

First Case.—W. F., six years, male, sickened November 13th. First injection of Behring's antitoxine, 80 minims, November 16th, 8.40 p.m. Second injection, November 17th, 90 minims, 8 a.m. At the time of the

injection the patient was well nourished, appetite poor, pulse 138, temperature 99 $\frac{2}{3}$ F., respirations 24. Had marked laryngeal symptoms: Stridor, hoarse croupy breathing, croupy sound on coughing, small amount of membrane in uvula and inner side of tonsils. No albumen in urine. Bacteriological examination of membrane by Professor Shuttleworth revealed Klebs-Löffler bacilli with streptococci and staphylococci. The membrane began to disappear November 19th, and was entirely gone at 4.20 p.m. November 21st. Throat secretion contained Klebs-Löffler bacilli, November 23rd and 30th. Retained in hospital twenty-eight days, discharged well. The ordinary local and constitutional treatment carried on simultaneously.

Second Case.—W. S., five years, male; sickened November 28th. First injection of New York Pasteur Institute serum, 15 cubic centimetres, December 2nd, 6.30 p.m. Second injection, 5 cubic centimetres, December 3rd, 10.30 a.m. Patient well nourished, appetite poor. Pulse, 126; temperature, 101.3F.; respirations, 26. Slight membrane on tonsils, none on palate or pharynx; marked laryngeal symptoms, stridor, etc. Bacteriological examination of membrane made by Professor Shuttleworth showed an almost pure culture of Klebs-Löffler bacilli, with scarcely any micro-organisms. December 3rd, patient expectorated large portion of membrane, about 5 inches long, from trachea. December 4th, died.

Third Case.—E. D., four years, female, sickened December 1st. First injection of New York Pasteur Institute serum made December 3rd, at 6.30 p.m., 15 cubic centimetres. Second injection, 6 cubic centimetres, December 4th, at 10.30 a.m. The patient's general condition was good. There was laryngeal huskiness. Temperature, 100.4° F.; pulse, 110; respirations, 24; albumen, $\frac{1}{3}$. Membrane abundant on roof of mouth, tonsils, uvula, and pharynx. Bacteriological examination of membrane by Professor Shuttleworth, showed Klebs-Löffler bacilli, with streptococci. Membrane existed December 23rd, and there were Klebs-Löffler bacilli in abundance at that date. She was discharged well on January 7th, 1894. No sequels. The usual local and constitutional treatment was conducted, as if no serum had been used.

A report presented by the Provincial Board of Health of Ontario contains the record of twenty-four cases of diphtheria treated by nine physicians. Four patients died, giving a mortality of 16.66 per cent. Behring's serum was used in one of these cases, the New York serum in the other twenty-three cases. Bacteriological examination of the membrane was made in ten cases.

N.B.—The Provincial Board of Health will continue to supply serum to hospitals and physicians who wish to use it in their practice. Statistics will be presented at the meetings of the Board showing the results obtained.

Special Selections.

THE SERUM TREATMENT OF DIPHTHERIA.

By Dr. E. ROUX.

Since Behring and Kitasato described the qualities of the serum of animals rendered immune to tetanus and diphtheria, the question of serum therapy has been the all-absorbing topic. Why should not our whole attention be directed toward these antitoxines, which constitute scientific and specific remedies against the most formidable diseases which, up to the present, have been so unsuccessfully combated with empirical methods?

The antitoxine of tetanus was first studied, because it is more easily obtained, and manifests its preventive action with marvellous power. In practice, however, it has not fulfilled all our expectations; for all the world admits that, even though it is of some value in tetanus, it is by no means a certain remedy. This is no doubt due to the fact that tetanus is diagnosed only at a period when contractions have already occurred, *i.e.*, when general intoxication has already taken place. At the time when the treatment is commenced, the disease is already in the last stage, consequently it is not surprising that the antitoxine is so ineffectual in tetanus. Fortunately this is not the case in diphtheria. It is true the latter is also a "toxine-disease," but here intoxication occurs only after the angina and laryngitis. We are, therefore, forewarned by the appearance of the pseudo-membrane in the throat and

larynx, *i.e.*, before the toxines have entered the organism. Were the pseudo-membranes not located upon easily accessible parts of the body, but in the stomach or intestine, we could detect the disease only by the severe phenomena, such as paleness of the face, albuminuria, disturbances of breathing and heart symptoms. But it then would be too late to act, and the diphtheria antitoxines would be of as little avail as the antitoxine of tetanus. To the fact that diphtheria is at first but a local disorder which, to a certain extent, originates under our eyes, do we owe our ability to better combat it.

In a series of publications, Behring, alone or with his co-labourers, Wernicke, Boer, Kossel, Knorr, has explained the manner in which he immunised the animals, how their serum acts towards the toxine and exerts a preventive and therapeutic influence upon animals which have been poisoned with diphtheria toxine or infected with living bacilli. Later, Behring and Ehrlich, in connection with Boer, Kossel and Wassermann, reported the first results of the employment of serum therapy in diphtheria patients. Since 1890, Roux, with the assistance of L. Martin and A. Chaillon, has also pursued experiments upon the treatment of diphtheria with antitoxine, at first on animals, then on children. He delayed reporting his results until he could present a large amount of material. To-day he can say that his results, as to both the treatment of animals and man, essentially confirm those of Behring and his co-labourers.

The animals supplying the serum are immunised to diphtheria, *i.e.*, made

accustomed to the diphtheria poison. The preparation of this poison is, therefore, the foundation of the serum therapy, and it is the more necessary to discuss it, since it is extensively used in order to immunise large animals; that is, to render their serum sufficiently effective. The most rapid process of obtaining diphtheria toxine is the cultivation of the bacilli in the presence of a moist current of air. Vessels with a flat bottom and supplied with a lateral tube are used. Alkaline bouillon, containing 2 per cent. of peptone, is placed in the vessels in such amount that the fluid reaches to a certain height. After sterilization they are inoculated with fresh, very virulent diphtheria bacilli, and heated in an oven to 37°C. The development once begun, a stream of air is admitted. After three to four weeks the culture is sufficiently rich in toxines to be employed. The ready cultures are filtered through a Chamberland's filter. The clear fluid is then preserved in well-stoppered bottles and kept in the dark at ordinary temperature. Prepared in this manner, the toxine, in doses of 0.10 ccm., is capable of killing a guinea-pig weighing 500 gme. in forty-eight to sixty-hours. It loses its effectiveness after a time, but this occurs very slowly if preserved in the manner above described.

The toxine once obtained, the next step is to immunise the animals. But in order to avoid calling forth in these too violent phenomena, it is necessary to first reduce the activity of the toxine. The best method for this purpose is that employed by Vaillard and myself in tetanus, namely, the addition of iodine. Diphtheria toxine

diluted with iodine is much less dangerous than the pure toxine. Immediately before use the toxine is diluted with one-fourth its volume of Gram's solution, and, after a few seconds, injected under the skin. A medium-sized rabbit bears a single injection of 0.5 ccm. of this solution. After a few days the injection is repeated, and so on for several weeks, whereupon the dose of iodine-toxine may be increased and the iodine content reduced. Gradually the pure toxine is reached. The animals must be carefully weighed, and the injections immediately stopped as soon a decrease of the body weight is manifested, as otherwise a fatal cachexia may be produced. Dogs rendered immune to diphtheria in this manner have supplied a very effective serum: on the other hand, sheep, and especially goats, are very susceptible to diphtheria poison; hence the immunising of such animals requires the greatest caution. The same is true of cows, the milk of which may, in addition, offer an important source of antitoxine.

Of all animals capable of supplying large quantities of anti-diphtheric serum, the horse is the most easily immunised. It bears the toxine much better than all the previously mentioned species of animals. It is not infrequent to find a horse in which the injection at one time of a 2-5 ccm. of the strong antitoxine causes but a quite transitory fever and a rapidly subsiding local œdema. If, with Behring, one assumes that an animal produces a stronger antitoxic serum the more susceptible it is to the toxine, then the selection of the horse would appear inappropriate.

However, since 1892, I, in connection with Nocard, have immunised horses to diphtheria, because the experiments which I carried out with Vaillard showed that the serum of the horse, even in very large doses was wholly uninjurious to animals and man. Injected under the skin, it is immediately absorbed without giving rise to any local reaction whatsoever. Besides, as often as desired, it is extremely easy to abstract from the jugular of the horse large amounts of blood in a wholly pure state, from which a perfectly clear serum is separated. He reports upon horses from whose jugulars blood was drawn more than twenty times by means of a thick trocar, and the vessel remained as pliable and free as upon the first day. The immunising power of the serum of these animals had attained the remarkable degree of 100,000, and this can be raised still higher. Another advantage of the employment of the horse for the production of serum, is the rapidity with which these animals can be immunised. As proof of this he claims that he was able within two months and twenty days, to advance from $\frac{1}{4}$ ccm. of iodine-toxine to 250 ccm. of the pure toxine without calling forth any pronounced local reaction or especial increase of temperature.

In regard to the experimental qualities of the serum, it can be determined that, when this serum is added to the diphtheria toxine, the latter is rendered harmless, so that it may be injected into animals without giving rise to either local or general disturbance. This action occurs not only in vitro, but also within the living organism. For example, a guinea-pig having

received a sufficient dose of the serum, resists thereafter an amount of toxine which would certainly be fatal to a guinea-pig of equal weight not previously prepared. The same result is also obtained if the toxine is first injected and a few hours afterward the serum injected. Of course the quantity of serum necessary for cure varies according to the weight of the animal, the dose of the toxine, and also the time when the injection is given. The protective and curative actions of the serum are not alone manifested toward the toxine, but also toward the living virus.

These qualities of the anti-diphtheritic serum were discovered by Behring. They constitute the basis of the therapy of diphtheria. They depend upon a special substance called "antitoxine," the nature of which is as little known to us as is that of the diphtheria toxine itself. The animals which receive the antitoxine are rendered immune to the disease in a very short time. This immunity is not permanent, but disappears after a few days or weeks.

For the estimation of the immunising action of the serum, Behring first proposed a method which consists in judging the strength of a serum according to the amount necessary to render an animal of known weight immune to a certainly fatal volume of toxine injected twelve hours after the serum. We say, therefore, that the serum possesses an immunising power of 1:1,000, when 1 gmc. of this serum renders a 1,000 gm. guinea-pig immune to a definite quantity of toxine which is capable of killing in a definite time. For some

time past this method of estimation has been replaced by another proposed by Ehrlich. According to this, the immunising unit is obtained from 1-10th ccm. of a serum which is capable of so neutralizing 9-10th ccm. of normal toxine that the mixture, injected under the skin of a guinea-pig, produces no local phenomena. Doses of 1-10th ccm. of the toxine used by us kills a guinea-pig of 500 gme. in forty-eight hours, and, in the amount mentioned, it is capable of so neutralizing 9-10th ccm. toxine that absolutely no œdema originates in an animal. No local reaction takes place even when 1 ccm. of a mixture containing 1-30th serum is injected. Only when the mixture contains 1-50th serum does a slight œdema originate, in which instance, however, the animal remains alive and well.

The preventive action of the serum is manifested when it is introduced before the toxine. In this case the animal is always resistant when the quantity of the serum corresponds to that of the toxine. For example, it is sufficient for the guinea-pig to have received twelve hours previously 1-100,000th of its weight of serum, in order to be made immune to a dose of toxine which will kill the experiment animals within five days. Given a dose of 1-50,000th serum, they resist the injection of a quantity of diphtheria bacilli which kills the control animals in forty-eight hours. If the toxine is first injected, then greater amounts of serum are required, the later the counteracting injections are employed. After six hours, injections of 1-1,000th are effective, but after twelve hours they are no longer so. On the other hand, after

subcutaneous inoculation of diphtheria bacilli, the counteracting injections are effective, even twelve to eighteen hours after infection. The anti-diphtheritic serum, therefore, does not possess, by long odds, the immunising power of the anti-tetanic serum, which acts preventively even in 1-100,000,000th part, and yet it produces better therapeutic results than the latter.

If an experimental diphtheria of the vulva is produced in a female guinea-pig after a preventive injection of antitoxic serum, the local phenomena decline upon the second day, and the pseudo-membranes are loosened, while in the control animals, the mucous membrane is red and œdematous, the temperature raised and the general condition very bad. On the other hand, if the serum, in doses of 1-10,000 to 1-1,000 of the body weight of the animal is injected after the inoculation of the diphtheria, the pseudo-membranes begin to loosen on the second day, and the animal is healed. If an injection of antitoxic serum is first given to a rabbit and then a diphtheria produced, the infection manifests no perceptible pathological phenomena if the diphtheritic serum is injected in sufficient amounts. Likewise, a well-developed diphtheria is overcome if the serum is injected at the proper time after infection. Regarding diphtheria associated with other bacteria, especially streptococci, the results obtained were less satisfactory; however, he was repeatedly able to save rabbits, which were treated six to eight hours after tracheal infection; but the injections of serum had to be repeated a number of times. In the cases in which the treatment was not begun until twelve hours after infec-

tion, the animals died without exception.

After the question of the treatment of diphtheria with serum had been solved experimentally, the employment of the serum upon man was in order. All of the trials were made, in connection with Martin and Chaillon, in the Hospital de Enfants Malades. From February 1st to July 24, 1894, there were received in the diphtheria pavilion of the hospital mentioned, 448 children, of which 109—24.33 per cent.—died. In the same pavilion the mortality, in the years 1890-1894, amounted to 51.71 per cent. in a total of 3,971 children. Therefore, under otherwise identical conditions, R.'s treatment reduced the mortality by 27.38 per cent. During the period when these experiments were made, 500 children affected with diphtheria were treated in the Hospital Trousseau, of which 316—63.20 per cent.—died. The assumption that a mild epidemic existed at the time of the experiments is absolutely to be excluded.

In order to form a correct idea of the capabilities of serum therapy, from the 448 cases mentioned must be subtracted 128 in which bacteriological examination excluded the Lœffler bacillus—*i.e.*, were not diphtheria. Further, there must be deducted twenty cases in which exitus lethalis had occurred before any treatment whatsoever could be instituted. There remain, therefore, 300 cases of true diphtheria of which seventy-eight—26 per cent.—died, while statistics made at a previous time under precisely the same conditions, give a mortality of 50 per cent.

The serum employed by R., taken from immunised horses, has an effec-

tiveness of 50,000 to 100,000. All new patients received systematically 20 ccm. in a single dose injected under the skin of the flank. The injections were not repeated if the bacteriological examination showed the case not to be true diphtheria. The injection is not painful, and, when carried out antiseptically, is followed by no accidents. Twenty-four hours after the first injection a second of 20 or 10 ccm. is given, and these two injections usually suffice to bring about a cure. In the cases where the temperature remains high, a third injection of 10-20 ccm. was given. As the average body weight of a child is 14 Kg., they received, in general, more than 1-1,000 of their weight, and in exceptional cases almost 1-100. With the use of the serum therapy, post-diphtheritic sequelæ very seldom occur, though R. did observe paralysis. Sometimes he saw an exanthem similar to urticaria occur during convalescence. This is caused by the animal serum and soon disappears.

The cases of diphtheria treated by R. must be divided into two groups: the angina and the croup cases. Among the angina, the true diphtheritic must be separated from those associated with other bacteria. One hundred and twenty cases of true diphtheritic angina were treated, of which nine—7.5 per cent.—died. Of these nine children, seven remained but twenty-four hours in the hospital. If these cases are subtracted, a mortality of 1.66 per cent. remains. Of the two remaining children, one had coexistent tuberculous peritonitis, the other suffered from severe measles. It can, therefore, be considered that every true diphtheritic angina may

recover, if treated at the right time. Under the influence of the injections, the general condition remains unusually good; the temperature rapidly declines, often after the first injection. In very severe cases of angina diphtheritica it falls by lysis after 2-3 injections. The pulse does not return to normal as quickly as does the temperature. The pseudo-membranes cease to spread within the first 24 hours after the first injection, and they become loosened after 36 to 48, at the latest, 72 hours. Only in seven cases did they remain adherent for a longer time. Statistics show that a third of all cases of diphtheria are accompanied by albuminuria. The serum therapy reduces the frequency of this symptom.

The results are otherwise in cases of angina complicated with other bacteria. Those cases associated with staphylococci were cured in toto. On the other hand, thirty-five cases associated with streptococci, twelve—34.28 per cent.—died, while the usual mortality in such cases amounts to 87 per cent. The general phenomena were decidedly improved, and the pseudo-membranes separated more easily. In this group of cases the injections had to be increased; the quantity employed amounted to as much as 75 ccm.

The cases of croup are to be divided into operated and non-operated. In the first category belong ten cases, with one fatal issue; in this case the larynx-diphtheria was complicated with streptococci. In the group of operated croup belong 121 cases with fifty-six deaths, *i.e.*, a mortality of 46.28 per cent. As in the case of angina, the operated cases of croup

must be classed as pure and those associated with other bacteria, since they are of different severity. Of forty-nine pure cases, fifteen—30.61 per cent.—died; but if four cases in which death occurred twenty-four hours after reception in the hospital, are subtracted, then 22.44 per cent. remains. Among the cases of croup associated with other bacteria were nine associated with the small coccus, with one death; and eleven associated with staphylococci, with seven deaths—63 per cent. If from this group, three cases which died twenty-four hours after entering the hospital are deducted, there remain but four cases. Fifty-two cases of croup associated with streptococci show a mortality of thirty-three—63 per cent. The majority of these fatal cases were caused by broncho-pneumonia, sometimes, also, by pseudo-membranous bronchitis. In a few cases measles and scarlatina coexisted. If, from the total of the operated croup cases, those are deducted which it is impossible to look upon as bad results of the treatment, then 107 operated cases give a mortality of 39.35 per cent.

Although these figures are very encouraging, still more favourable results can be attained by proper hygiene and complete isolation. Aside from scarlatina and measles, streptococcus infection is especially dangerous. R. saw twelve cases, which began with true croup, die suddenly from streptococcus pneumonia. This was dependent upon the fact that the tracheotomized children occupied the same room. True epidemics of broncho-pneumonia are seen to arise as soon as a child suffer-

ing with croup associated with streptococci is received.

Finally, the treatment must be begun as early as possible. In this way, and by the employment of cubage, it will be possible to allow tracheotomy to become a rare procedure. In conclusion, it may be mentioned that in the serum therapy every kind of local treatment was excluded, and only irrigation of the throat with boiled water practised.

[This article has been taken complete, because of the importance of the subject.—Ed.]—*From A. M.—S.B.*

THE PREVENTION OF DIPHTHERIA.

The following, furnished for publication by the New York Health Department, we reprint for our readers, because of the valuable information, gained by practical experience, it suggests as to common modes of the mysterious (?) spread of infectious diseases.

The attention of the Board of Health is directed to the necessity for the adoption of some more adequate means to prevent the extension of contagious diseases in tenement houses and apartment houses, and particularly for the enforcement of isolation of persons sick with these diseases. The methods which have been long employed in the Health Department, *i.e.*, frequent visitation and instruction by Department Inspectors, have been found to be only partially effective. It has been the custom for years, in cases of contagious diseases, for the Inspectors of the Department to visit the families

of the sick persons, inform them as to measures of disinfection and methods of isolation, and at the same time to notify other families in the house of the existence of a case of contagious disease in a given apartment. This method of giving publicity to the case and of warning other occupants of the house is ineffective in the accomplishment of the desired end, *i.e.*, the complete isolation of the patient and the prevention of further infection. Notifying all the inmates of a large tenement is a very difficult matter, and, if notified, experience has shown that they soon forget the existence of illness in the house. Repeated inquiries have demonstrated the fact that frequently many of the inmates of the house where there is a case of contagious disease do not know of the existence of any sickness.

Further than this, this method fails entirely to protect strangers or visitors who may go to the house or apartment. Ladies in search of servants have been repeatedly found in houses or in apartments where cases of contagious disease were present, and servants who have been living with families where there are cases of contagious disease, on obtaining situations frequently go to their employer's house carrying infection with them; or, when relieved from duty for an afternoon or evening, visit where there are cases of contagious disease, and not infrequently carry infection back to the houses in which they are employed. Very commonly washing or various kinds of sewing is secretly done by other members of the family in apartments where such cases are ill, and the garments thus infected on the premises are later

returned to the owners. In small shops business is sometimes carried on, and in one of several instances recently, a number of cases of diphtheria were directly traced to an infected candy store.

Notifying inmates of the house is ineffectual, further, because it has been found that, as a rule, intercourse of families in tenement houses is not with others in the same house but with families who live in other houses, and the latter are entirely unprotected by the methods at present followed.

It has seemed to us, after careful consideration of this subject, that the desired object would be best obtained by the placarding of apartments in tenement houses where cases of contagious disease exist, and we therefore have the honour to recommend that hereafter the Chief Inspector of Contagious Diseases be authorized, in his discretion, to placard apartments in tenement houses where there are cases of contagious disease. The following considerations may render more apparent the necessity for this action :

I. Under the present conditions it is impossible to prevent strangers and visitors from entering apartments where there are cases of contagious disease, and they or their clothing thus frequently become infected, and either they contract the disease themselves or they submit it to others. These strangers or visitors are usually not aware of the existence of disease in the house or apartment, and unwittingly expose themselves and act as media for the dissemination of the disease. If apartments were placarded, this means of dissemination would be prevented.

II. In diphtheria, as has been repeatedly and abundantly shown by the investigations of this Department, patients are often apparently well long before they are free from the infectious agents, and in spite of repeated warning from Department Inspectors, these patients, especially when children, mingle with other children and thus transmit the disease to them. This is one of the most common and important means for the dissemination of diphtheria, and it is of no less importance in scarlet fever and measles, as in the latter diseases desquamation frequently continues many days after the patient has apparently quite recovered.

III. There are at present no means by which other inmates in tenement houses can know when convalescent cases of contagious diseases have ceased to be dangerous. They can only be governed by appearances, which, as we have seen, are deceptive. If apartments where cases of contagious disease existed were placarded, isolation would be enforced by the other occupants of the house until the Department Inspectors allowed the placards to be removed.

IV. The moral influence of such placards, both upon the inmates of the apartments, the inmates of the house and strangers or visitors to the house, would be of as great service in enforcing isolation and preventing extension of disease as the visits and instruction of our inspectors. It has been found impossible, even where daily visits were made by medical inspectors, assisted by the Sanitary Police, to enforce the isolation of children convalescing from diphtheria and scarlet fever after the serious

symptoms have disappeared. It is undesirable at such times, unless absolutely required, to remove such patients to the hospital, and yet in the eruptive fevers this is the period of the disease when there is greatest danger of transmission to others.

During the last year we have had a serious epidemic of diphtheria to deal with. The number of cases reported weekly during the last month, however, has steadily decreased. The schools have just now opened, and it seems to us that the most strenuous efforts should be made to prevent a new outbreak of the disease or its reintroduction to the schools. This measure would be of undoubted service in accomplishing the desired object.

We would recommend, however, that placards should be nailed to the outside doors of the apartments in which cases of contagious disease are present, when in the judgment of the Chief Inspector of Contagious Diseases this course seems to be desirable, and that the placards should bear the following inscription, differing as to the name of disease in question and as to color. The color for diphtheria should be white; for scarlet fever, red; for measles, blue.

"DIPHTHERIA.

"All persons not occupants of this apartment are notified of the presence of diphtheria in it, and are warned to avoid entering it until this notice is removed. The persons sick with diphtheria must not leave as long as this notice remains here.

"By order of the Board of Health,

"———, President.

"———, Secretary."

SANITARY CONDITION OF
DAIRY FARMS.*

By Dr. JOHN M. PARKER, Haverhill, Mass.

In a paper read before the American Medical Association in 1891 on "The Treatment of Chronic Pulmonary Consumption," the essayist remarks: "Our surroundings make us what we are. If our treatment could begin with the birth of the patient, in 99 per cent. of cases, we should have no tuberculosis to treat. *No matter about the family history.*" This remark applies equally well to dairy cows. *Their surroundings make them what they are.* And I venture to assert that, if the *sanitary and hygienic* conditions were what they should be, we would have little or no bovine tuberculosis in our dairy herds. It is the common, every-day life a person leads that governs his health; and it is the common, every-day life the dairy cow leads that governs her health and vitality. *Their surroundings make them what they are.*

Sanitary science has made vast strides in the last twenty years, yet our dairy farms are in practically the same condition they were in fifty or one hundred years ago. In fact, no effort is made on the average farm to conform to any sanitary laws or regulations whatsoever. The old barbarous practice of confining the cattle in stanchions is still in use; the old barn and barn-yard with its strong odour and slimy filth is still in existence.

Sanitary science is advancing every

* Read before the Massachusetts Veterinary Association, May 23rd, 1894.

year. Our cities are well drained ; our drinking-water is carefully guarded ; houses and schools must have sufficient light and air ; our young men and children must have exercise ; but yet our dairy cattle are expected to retain their health and strength and to maintain their vitality shut up for months in close barns, without ventilation or fresh air, and with little light—compelled to stand in their tracks unable to move ; unable to turn around even to lick their sides.

It seems strange that the entire question of the sanitary improvement of our dairy farms should have escaped notice as it has. It is not a new subject. For many years past, authorities have agreed that the principal predisposing causes of tuberculosis are poor sanitary and hygienic conditions, and yet notwithstanding the universal prominence given to sanitary conditions as predisposing causes, they are almost entirely ignored among the prophylactic measures suggested by many of these same authorities.

In showing that sanitary conditions are not observed as they should be on dairy farms, I have attempted to tabulate the conditions as found on twelve farms in this vicinity. These are not picked out, but are taken at random from farms visited from day to day. The table shows roughly the amount of cubic space per cow ; the ventilation, light, water supply ; whether there is a cellar, with its condition ; and how the manure is disposed of. You will notice, as a rule, that the cattle are far too crowded. In the city of Boston each animal must have 1,000 cubic feet of space, and probably, with good ventilation, that may be sufficient ; at any rate it is an immense improvement on many farms in other parts of the State ; but even 1,000 cubic feet is altogether inadequate if there is no ventilation. What must be the condition of the barns then, when as in No. 5, there is only 143¼ cubic feet for each animal, with no ventilation? In only three farms out of the twelve, you will notice, is there any attempt at ventilation, and even in these it is more in name than fact. And in not a single barn that I have been in is there any provision made for the admission of fresh air.

Of the twelve barns visited, four had good light, two had only fair light, five had very poor light, and one had no light at all.

As a rule, New England farms have good water, but on some farms the wells are situated too near the yard and receive the surface drainage, and in some instances the cattle are even watered in creeks and puddles formed by the surface water.

Keeping the manure in the cellar

No.	No. of Cattle	Cu. ft. each.	Ventilation	Light.	Water.	Cellar	Disposal of Manure.
1	7	465	None	Poor	City	Yes	Cellar
2	10	236	None	Poor	Spring	No	Outside barn
3	1	440	None	None	City	No	Outside barn
4	6	224	None	Poor	Spring	No	Outside barn
5	4	143	None	Poor	Spring	No	Outside barn
6	7	800	Stair-way	Fair	Spring	Yes	Cellar
7	7	416	None	Gcod	Well	Yes	Cellar
8	12	487	None	Good	Well	Yes	Cellar
9	10	1,165	Good	Fair	Well	Yes	Cellar
10	3	266	Poor	Poor	Well	Yes	Cellar
11	3	1,336	None	Good	Puddle	Yes	Cellar
12	12	233	None	Good	Spring	Yes	Cellar

is another common practice. In eight of these twelve barns the manure is kept in this way. At the farm referred to as No. 8, there are twelve cows, each cow with 487 cubic feet of space. This barn is well lighted; the windows facing the south; but there is no ventilation whatever, except when the door is open. This farmer makes a special boast that his cattle are not out of the barn from fall till spring. They are watered in the barn, and the manure is dropped into the cellar below, where it is allowed to remain till removed in the spring. In making a visit to this barn during the winter, a man who was with me had to leave the barn because of the foulness of the air.

At another farm, Nos. 2 and 4, there are two barns. In one containing ten cattle, each animal has 286 cubic feet with no ventilation and only one small window for light. The other barn has six cattle, each animal having 224 cubic feet. This one also is without ventilation or sufficient light. In these barns the air was very bad.

At No. 5 there is no ventilation and only one small window for light. In this barn each animal had only $143\frac{1}{4}$ cubic feet. Two out of four animals were evidently tuberculous.

At No. 10 three cows are kept in a tightly boarded pen, 10 x 10 x 8, giving about 266 cubic feet to each animal. At this barn there is a small ventilator and one small window, but in winter when everything is tightly closed, the atmosphere is fearful.

The other day I visited a barn No. 11, and in conversation with the owner, I asked him where he watered his stock. "In the puddle outside,"

he answered. The puddle was a marshy place where the water lodged in wet weather. It was situated about twenty yards from the barn and formed part of the yard. The manure pile was on sloping ground at the side and drained into the puddle.

At No. 12 there are twelve cows, each having 233 cubic feet, with no ventilation whatever, the farmer taking special pains to have a heavy canvas curtain in front of the cows. This is a fearful hole in winter time, and it has the reputation of being the hottest barn in the district. This farmer is said to lose three or four cows every year.

No. 3 is a small shanty in the city with neither window nor ventilation. The water is carried to the cow, and she is in the barn winter and summer. Inside the barn is terribly filthy.

At another farm (the State Experimental Station of a neighboring State), the barn is so hot and close in winter that a friend of mine who was visiting there, had to leave and go into the open air because the hot, foul air in the barn made him sick and inclined to vomit.

These, gentlemen, are common examples of the average New England farm. Farmers have been taught to do the very things that are injurious to their stock. They have been taught to keep the manure in the cellar. What is the result? You have a damp, chilly atmosphere full of foul odours and organic impurities. They have been taught to keep the barn close and warm, and the only heat it gets is from the animal body. The hotter, they think, the better it is.

In the great majority of dairy farms.

there is not even a pretence of ventilation, while the cattle are packed in as close as they can conveniently be put. A cow has about four or five times the lung capacity of a man, yet on many of the farms each cow has only a tithe of the space required by a child under seven years of age, and that without any ventilation.

Fresh outside air contains only a trace of carbonic acid, about four parts in 10,000. The air of a room would be only fairly good with eight or nine parts in 10,000, yet some barns have as much as fifty or sixty parts of carbonic acid in 10,000; and I have no doubt, if the percentage were taken during cold weather in winter when the barns are tightly shut up, the air would be very much worse. When only a small quantity of carbonic acid is contained in the air, the carbonic acid in the lungs is very readily diffused through the atmosphere; but when that atmosphere has become impure, when it contains a large amount of carbonic acid with organic impurities, then the carbonic acid in the lungs is not so readily diffused through the air—it has found its level, and is retained in the system, where it lowers the vitality, causing the dullness and lethargy experienced by anyone after sleeping all night in a close room.

In calculating the amount of impurity in the atmosphere of a barn, the carbonic acid is taken as the standard of impurity only because so far no simple means has been discovered by which the other impurities can be determined, so that the amount of carbonic acid shows only relatively the amount of impurity in the air.

When a ray of light penetrates a dark place, innumerable particles are seen floating in the air. In a barn these particles of so-called dust are organic matters given off by the occupants, as well as fungi, bacteria, dried manure and particles of hay and grasses. It is this dust that is so dangerous as a source of infection in tuberculosis. The manure, as pointed out by Billings, contains the bacilli; when dry it becomes pulverized and powdery, and along with the discharges from the nose, it mixes with the dust and chaff and the other impurities in the air which are breathed by the cattle—ventilation which would rid the atmosphere in the barn of these impurities, being altogether lacking.

Drainage, and dark and damp cellars under the barns have a close relationship to the ventilation and warmth of the barn. The wet and filth usually found in the cellar, keep the air of the barn damp and chilly; while the decomposing animal and vegetable matters give off a quantity of carbonic acid which contributes largely to swell the amount already in the barn.

The cellar is considered by many farmers to be a necessity. There the manure is kept; there odd tools and implements are stored; and if the barn upstairs gets too crowded, one or more animals will be turned into the cellar. It is always dark and damp; the sunlight never penetrates there; the manure is thrown down, the liquid portion runs along and soaks into the ground; in many cases it is a little lower than the yard, and more or less of the surface water flows into it. It is never drained; usually it is damp and wet all summer long;

the ground only dries by evaporation. According to Professor Kedzie, "To evaporate one pound of water consumes enough heat to raise the temperature of five and one-half pounds of water from freezing to boiling point;" or, to vary the illustration, "Suppose that a tile drain discharges constantly for one day a stream of water whose cross section is one square inch, and velocity two and one-half miles an hour, *this one day's drainage would save the heat equivalent to nearly six tons of coal.*"

Further, we must remember that barns are usually warm; this warmth causes a current of air upwards, so that this damp, chilly air is drawn up into the barn above, where it does the most harm. In referring to this condition Professor Kedzie forcibly remarks: * "The evaporation of so much water renders the air over such a soil damp and chilly. This result is a physical necessity. This damp and chilly atmosphere has a more serious result than the simple feeling of discomfort. It has a most depressing influence on the human system, lowering its tone, enfeebling the vital powers, and acting as the predisposing cause of a long list of diseases, some of them the most destructive and incurable known to the medical profession. The depressing influence of the dampness and chilliness of a water-soaked soil is not to be compared to the effect of an occasional wetting, as when we are caught in a shower; the chilly dampness of the undrained soil is persistent and unremitting, dragging us down with its cold fingers at all hours, at

'noon of day, and noon of night,' as if we toiled and rested, waked and slept in a perpetual drizzle of cold rain. It may seem a small force at first, but its persistent, untiring and relentless pull tells upon the strongest at last like the invisible fingers of gravity, which finally drag down all to a common level. This depressing influence is not developed suddenly and distinctly; but silently and secretly the sapping and mining go on till the explosion comes in sickness, suffering, and the sleep that is eternal."

If it is necessary to have cellars, then it is most essential that they should be well drained, well lighted and well ventilated; and the manure, instead of being dumped into the cellar, should be carried some distance from the buildings. Care should also be taken that the well is not situated so as to receive the surface drainage. Too often the well is situated in or near the barn-yard, and I have known cases where, through either ignorance or carelessness, the cows were watered from a puddle or hollow near the barn, into which the surface water from the barn-yard drained.

Light is another essential that is almost entirely neglected. Good light is just as essential to the health of the "higher animals as it is to plant life." We ordinarily get too much in the habit of viewing light in barns, as being simply for the purpose of enabling us to see what we are doing. Light, however, has a direct bearing on the health of the body, and an even more direct influence on the causation of this special disease under consideration. Light is especially

*New Hampshire Board of Health Report.

necessary where, through want of exercise, the circulation is sluggish and the system is depressed; light will stimulate the circulation. It increases the oxidation; more carbonic acid is given off, and the functions of the whole body are quickened and enlivened; but sunlight also retards the growth of germ life, and more than that, the vitality of certain forms of bacteria, including anthrax and tubercle bacilli, is destroyed by the action of light. So that while light is necessary for the healthy development of the higher forms of life, it is detrimental to the lower forms of life. And yet in how many barns are we able to see distinctly? In how many barns can we even see to read a thermometer without going to the window?

Nor are the above the only conditions that tend to impair the health of the dairy cow. On the average farm no care is taken, not a single precaution is observed to prevent the health of the dairy cow from breaking down under the strain to which it is subjected. Everything is made subservient to the one sole and single object of getting a large milk supply.

One would think that common-sense would teach that to keep cows for months without their stirring out of their tracks is, to say the least of it, an unnatural condition of things. Exercise is just as necessary for a cow as it is for the rest of the animal kingdom, yet it is something the dairy cow does not get.

Everyone knows that exercise increases the flow of blood to the muscles; and in consequence of the greater amount of waste products carried off, and the greater amount

of oxygen required by the system, a quickening of the heart's action and a quickening of breathing result. On the other hand, when little or no exercise is taken, the circulation becomes sluggish, and the heart, like any other muscle, degenerates for want of use; the breathing becomes shallow, and the lungs are not expanded. When any extra strain is put upon them, they are not able to do their work; and we have rupture and permanent dilatation of air-cells, along with weak lungs and a predisposition to pulmonary disease.

Exercise, on the other hand, causes an increased flow of blood to the lungs, with an increased vitality and strength. The increased flow of tidal air in and out of the lungs will tend to prevent the slow-growing tubercle bacilli finding lodgment, and in this way prevent their growth and development in the lungs.

In referring to exercise, I don't wish to be understood as advocating a large field or range for the cattle to run over. I don't wish to advocate anything impractical; but I do think that the present method of confining the dairy cattle with stanchions is capable of improvement. I do think they ought to be allowed their liberty; and further, I do not see anything impractical in any such suggestions. Any condition that affects the comfort of the animals must affect their general well-being. Everyone here must have seen how cows will rub and scratch themselves when first let out for water; often, even when thirsty, they will not touch the water till they have first licked themselves all over. It is impossible to stand behind a row of cattle for five minutes

without seeing one or the other make a more or less ineffectual effort to scratch the body. No animal can be comfortable, confined as they are in New England at the present time.

Everyone knows that these conditions exist and are detrimental to the health of the animal. Then why are they not attended to? It is because through force of habit we have got accustomed to them, and we simply take it for granted that these conditions cannot be improved.—*Boston Med. and Surg. Journal.*

THE AGRICULTURAL ASPECT OF TUBERCULOSIS.*

By Dr. W. R. SESSIONS,
Secretary Massachusetts State Board of Agriculture.

It is but a few years since tuberculosis in cattle was known to the public to be prevalent. The attention of scientists, particularly of veterinarians, has lately been directed to the disease as a source of danger to the life and health of the human family. Investigations have proved the disease to be generally prevalent among the cattle in all thickly inhabited countries, although most of the cattle affected show few outward indications of the disease. In fact, a large majority of such infected animals are apparently healthy, and the presence of the disease cannot be detected with certainty without the use of tuberculin.

The danger to human life and health has been discussed and magnified until the public are demanding

action by the State authorities for their protection. Authority has been given to the Cattle Commissioners to kill without appraisal all cattle found to be infected with the disease.

The discovery that the injection of tuberculin is a very reliable method of detecting the disease has led many to believe that this should be applied by the authorities to all suspected herds, and some people are of opinion that all the cattle of the State should be subjected to this test. From the experience thus far had in the use of tuberculin, we are led to believe that a large proportion of the cattle that are apparently healthy would be condemned by this test. The present law provides no recompense to the owner of such cattle. These conditions make the agricultural aspect of tuberculosis very serious indeed. The neat stock of the State is rapidly decreasing, the decrease having begun with the agitation of the danger from tuberculosis. In 1890, 200,658 cows and 62,549 neat cattle other than cows were assessed. In 1893, 186,806 cows and 47,528 neat cattle other than cows were assessed, a decrease of 13,852 in cows and of 15,021 in other neat cattle, making a total decrease of 28,873 in three years. The number of cows had been previously quite steadily increasing for thirty years from 149,090 in 1861 to 200,658 in 1890.

The dairy is easily the most important branch of farming in Massachusetts. The State census of 1885 gives us the latest reliable figures. By that the value of dairy products was \$13,080,526; hay, \$9,676,893; other staple products, \$4,578,763; fruit, \$2,386,290; vegetables (potatoes

* Read before the Massachusetts Veterinary Association, May 23, 1894.

are included in staple products), \$2,762,941 ; animal products, \$5,398,439. The hay crop is quite largely dependent upon the dairy interest, and the animal products are so largely dependent upon the dairy as to be almost a part of it. The veal product is certainly a dairy product, and most of the veal of the State is grown on the skim-milk of our dairies.

If the killing of tuberculous animals is to go on without compensation to the owners, this most important industry must rapidly decrease, carrying along with this decrease a still greater decrease in the value of much of the farming property of the State. The fine dairy barns that dot the farms of the State will become valueless and the pastures will be allowed to grow up to brush. The State can ill afford a decrease in its agriculture and its agricultural population. If the fight against tuberculosis is for the public good, the public should make part, at least, of the sacrifice deemed necessary. Especially is this proper in view of the fact that many cases of tuberculosis in human subjects do not terminate fatally and many apparently recover. I quote from "Tuberculosis in Relation to Animal Industry and Public Health," by Dr. James Law. "Dr. Biggs tells us . . . that in the Charity Hospital of the city [New York], 30 per cent. of all deaths show old lesions of tuberculosis now becoming stationary. He quotes a Vienna hospital pathologist to the effect that he finds similar old stationary lesions in 85 per cent. of all post mortem examinations. This leaves but 15 per cent. who have not

suffered from tuberculosis." It is not too much to claim that a like proportion of bovines slightly affected with tuberculosis would never be apparently injured by it. Such cases should be paid for in full, if sacrificed for the public good. But it would be difficult for the officials to discriminate in the matter of allowance for cattle killed; and so it would probably be better to fix upon a portion of the value of the animal in health as the amount that should be paid to the owner of an animal condemned to destruction because infected with tuberculosis. I believe the owners of neat cattle as a class are unwilling to bear all the burden. They believe that if the public takes arbitrary possession of their property and destroys it, that an equitable portion of its value should be returned to them. In view of all that we know of tuberculosis, it cannot be determined what an equitable proportion is, and the manner must be decided by granting an arbitrary part of the original value.

The value of the animal condemned is but a part of the loss to the owner. His business is broken into; his herd is discredited; his customers are afraid of his product; and if permanent future immunity is to be gained by him, he must be to a large expense in disinfecting his barns and stables. This disinfecting is out of his line, but is as necessary to the public health as the slaughter of infected animals. The State should see that it is properly done; and it could be done cheaper and more certainly by agents of the State than by the numerous private owners. Why should not the State provide for this

very necessary part of the protection of public health? Dr. Law says in the paper quoted above, "Sanitary laws, which in any way ignore or disregard the rights of property have within themselves the seeds of defeat.

. . . If the stock-owner is not fairly reimbursed for his animals slaughtered, and for other losses sustained for the protection of the public health and of the country's herds, unscrupulous men will find ample means of trading off the as yet incipient and occult cases of tuberculosis, thereby planting the infection in new herds. Compensation must stop short of making the sanitary bureau a profitable customer for tuberculous animals at sound prices, but it must be so liberal as to enlist the ready co-operation of the stock-owner in having every infected beast safely disposed of."

The State is bound to protect the life and health of the people, and is also bound to do justice to all parties. The State is also, for its own good, bound to foster agriculture, for no nation can long continue prosperous without a prosperous agricultural population. A large per cent. of the successful men of our nation have always been supplied from those born and reared on farms. It must continue to be so. And the more prosperous the rural population is, the larger proportion of able and faithful young men will it furnish for the service of the city, State and nation.—*Boston Medical and Surgical Journal*.

As long as the bacteria of any disease are not killed by heat, or by antiseptic medication, Prof. Keen says they live on indefinitely.

ONTARIO SHOULD DO LIKEWISE.

The current number of *DOMINION MEDICAL MONTHLY* devotes a good deal of space to the subject of bovine tuberculosis, special attention being given to recent legislation passed by the State of Massachusetts to eradicate the disease. The Massachusetts Veterinary Association held a meeting in the early part of the year, and one month after that meeting the State Legislature passed an Act of 61 sections, entitled "An Act to codify and consolidate the laws relating to Contagious Diseases among Domestic Cattle." An appropriation of \$25,000 was made to carry out the provisions of the Act during the balance of this year. Under this law the cattle that have been owned in this State prior to condemnation are, if condemned by the State Cattle Commission, paid for by the State at half their agreed value, regardless of their tuberculous condition, if the autopsy confirms the fact of infection. If the autopsy shows no disease, the full value of the animal will be paid. In the case of cattle from without the State there is no compensation if disease is proved, but full value is paid if no disease is shown at the autopsy. The Commission is careful, in every case of condemnation, to establish the value of the animal, either by agreement with the owner or by appraisal, before the animal is killed.

The tuberculin test is used to establish the existence of tuberculosis, and much confidence is felt in it by the Commission. The cost price of each dose is about twenty

cents. The Commission is using about \$120 worth a week, but the tuberculin is furnished free by the Department of Agriculture in Washington. The experience of the Commission in the enforcement of the law during one week at Brighton and Watertown would indicate that at least 12 per cent. of the cattle in the State are tuberculous.

Referring to the prevalence of tuberculosis among cattle, Dr. Austin Peters, of Boston, says that the disease is most frequently met with among dairy cows from the districts of large cities and towns. Here it is found more among the older cows. The two great predisposing causes of the disease are insanitary stables, and the depleting influences of lactation. He also states that among fancy herds of pure breeds tuberculosis exists to an alarming extent. The rich agricultural Province of Ontario can very well afford to take a lesson from what Massachusetts is doing for protecting the people from the dangers arising from diseased meat and milk being served to the people by butchers and dairymen. Especially great is the danger in a city like Toronto, where the people are supplied with milk from dairies that are subject to no sort of official inspection. The people who use milk in Toronto would look with astonishment if they visited the stables from which a goodly part of their supply of milk is derived.

The facts of this tuberculosis question are undisputed. Everybody knows that the danger exists to an alarming extent, but no steps have been taken to introduce a remedy. The coming session of the Ontario Legislature will not have done justice to

the people of the Province unless it passes a bill calculated to remove this series of danger from the community.—*The World*, December 27th, 1894.

Tuberculosis is at present receiving a great deal of attention, particularly in Massachusetts. The effect of the Cattle Commission's inspections in that State for the detection and destruction of infected cows is seen at the Boston yards in the improved quality of the animals received there from drovers. The inspection at the two yards revealed for the first two weeks a tuberculous proportion of about 12 per cent. Recently, however, the drovers have exercised more care in the selection of cattle designed for these markets. In the week ending on December 20th, the number tested at Brighton was 190, of which twelve were condemned; and at Watertown only two out of eleven were found to be consumptive, the proportion having fallen in one place to 6 per cent. and in the other to less than 2 per cent. There can be no doubt whatever that like precautions are absolutely necessary in Ontario. Indeed, the day is not far distant when to protect the public dealers in milk and butter will be required to show that their products are derived from healthy animals.—*Mail*, January 2nd, 1895.

One per cent. of common baking soda put into the water in which instruments are boiled, in order to sterilize them, Prof. Keen says, will, to a very great extent, if not totally prevent rusting.

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TORONTO, JANUARY, 1895.

DIPHTHERIA.

We wish to draw the attention of our readers to the articles on Diphtheria in this issue, where we present a full report of Roux's work.

It must not be considered that the serum treatment of diphtheria is entirely without opposition, and while the *British Medical Journal* says that it is now past the experimental stage there comes the news to us of a more than usually heated dispute between Professors Virchow and Behring arising from the fact that Professor Virchow expressed doubts of the value of the remedy. He has retired from the dispute, but his general assistant has taken up the cudgels, and it is generally considered in his patron's interest. He claims in regard to the value of the antitoxine, that there have as yet been no cases treated in which this remedy alone was used, so that we cannot tell how much was due to

serum and how much to ordinary medication, further than this, that very much greater care has been exercised in treating patients at as early a stage of the disease as possible, much earlier than is customary in general or in hospital practice. Further, that a large number of the cases treated and reported in all probability were not true diphtheria at all. Strength is lent to this assertion from the fact that the only true test (and it must be said that this is disputed) is by vaginal inoculation of the guinea-pig, and as this takes some time to develop, there is difficulty in arriving at an immediate diagnosis. We know that many cases of diphtheria in our cities are not reported, and we know just as well how many cases of less serious forms of throat disease have been intentionally or unintentionally classed with diphtheria. However, we will sincerely hope that in the interest of humanity the result of this dispute will only be to place the serum treatment on a firmer and sounder basis than ever.

A PHASE OF THE WOMAN QUESTION.

Dr. Manton, in his retiring address to the Detroit Academy of Medicine, says that if women are to take such a prominent place in future generations it must be well looked to that they are physically as well as mentally able to fill such positions as they may aspire to, and in considering this, he points out that the first care must be at the age of puberty, the gateway to motherhood. And here with the increased circulation we have feelings and sensations which

attract attention, or as it were, localize the parts tending to the production of solitary vice. And we often find reflex symptoms produced by adhesion of prepuce clitorides. Another point is that as the child develops, the uterus becomes more soft and vascular, and is in that condition in which any violent exercise may produce permanent displacement. If the girl escapes the first dangers, with the appearance of the menstrual flow; if she has not been properly instructed she still pursues her ordinary avocations. The result is serious derangement of function. Fortunately most girls pass the period of puberty in safety, yet a chain is only as strong as its weakest link, and so the integrity of a nation depends upon the physical and mental qualities of its individual constituents. Much trouble might be averted by proper watchfulness and instruction on the part of parents. The girl, during the establishment of the menstrual functions, should be an object of especial care. Over-study, over-exercise at the piano, or as is usual, both evils combined, have to be guarded against. Then, as regards physical development, by the systems in force in most institutions, the girls have to do everything with the precision of military drill. The result is an amount of nervous strain that nearly counter-balances any good effects. All such exercises should be undoubtedly under the supervision of a careful physician.

BOVINE TUBERCULOSIS.

It is with more than ordinary pleasure we call the attention of our readers to the editorials from the *World* and *Mail* anent the matter contained in

our December issue, and we cannot compliment them too highly upon the active interest that they display in the welfare of our citizens. It is so often the case that matters of this character are felt to be too scientific or theoretical, or apparently not of sufficient interest, to demand the attention of the lay press; and it is indeed a pleasure to read especially the strong editorial in the *World*. It is seldom that journalistic work obtains such prompt recognition and encouragement, and, following immediately on the changes in our staff, is particularly appreciated.

We are reproducing in this issue the last articles of this series, and can only say, as the daily press have so strongly said, following our presentation of the matter, that no time should be lost by our health authorities in obtaining similar protection for our citizens.

TWENTIETH CENTURY PRACTICE.

We are now in the closing decade of the nineteenth century. During the last two decades medicine has made giant strides, and has rapidly and honestly won a place among the exact sciences. Yet we have no authoritative work that places before the practitioner in a connected form the results of more recent scientific research and the practical deductions therefrom.

It is therefore with more than ordinary pleasure that we notice that Messrs. Wm. Wood & Co., known so favourably for nearly a century as medical publishers, are about to issue what they so aptly call "Twentieth

Century Practice." This is modelled on Ziemssens' "Cyclopedia of Medicine," and will consist of twenty volumes of about 800 pages each, issued every three months. The work is edited by Thomas S. Stedman, M.D., of New York, and the contributors will each be specialists in their departments. Considering the magnitude of the work, which will be sold only by subscription, the price, \$5.00 per volume for cloth edition, is exceedingly reasonable, and certainly should prevent any physician, who desires to be abreast of the times, being without it. But what makes this work more than valuable is the fact that in it is erected, at the close of the most progressive century yet known to the world, a monument to the patient research and scientific ardor of our noble profession.

MANUFACTURE OF SERUM.

We have had the pleasure lately of visiting the department fitted up especially for this purpose by the well-known firm of Parke, Davis & Co., in Detroit. There we found a perfectly equipped Bacteriological Laboratory, with a special room fitted up with all the latest and most perfect sterilizing and culture apparatus, succeeded by another room especially designed for rearing and keeping the guinea-pigs and mice necessary in this work—the whole equipped in a manner, which, to an observer unacquainted with the methods of the firm, would seem to indicate not only a lavish but a reckless expenditure. We were informed that they expected, in the course of three or four months, if no accidents happened, to place a supply

of serum upon the market. This time, of course, as we know, is necessary for the development of the cultures and immunising the horses.

The profession may well congratulate itself that this new department is in the hands of a so thoroughly careful and ethical firm as our friends, Parke, Davis & Co.

The Physician Himself.

We propose from month to month in this column to discuss such matters as indicate the effect of the business tendencies of the present century upon medicine; to discuss from time to time the vagaries and eccentricities which tend to make the lay public laugh when they are told that nowhere except among physicians can you find so ethical, so noble and so self-sacrificing a class of men.

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Just at present the local sports are having some excitement during the close season by betting on the results of the various entries for inquests. How exciting the contest is may be seen by the following example:

Very lately there was a neck-and-neck race between two coroners to secure the inquest on an unfortunate man who was killed at a fire. The regular coroner sent in his warrant at one minute past midnight, on Sunday; the junior coroner arrived about five minutes later and was disgusted to find himself so much behind time. However, the junior coroner had the advantage of getting the first reading notice in the daily press in this connection, but as the race was so close, it was considered that an

amicable arrangement would be to divide the prize—not in the manner of Solomon and the woman's child, by cutting it in half—but that the coroner who got the warrant in first should have the inquest, and the coroner who got the reading notice first should have the post mortem.

* * *

It is alleged that the regular coroner, from being a corporation surgeon, has a pull on a certain class of accidents. On the other hand, the junior coroner is supposed to sit in with the police, and it is even alleged that in one police station the only name that appears and as it appears is Dr. —, Coroner. The question arises, what advantage does the coroner derive from these inquests? Now, it appears to us that there are three possible advantages. First, the natural desire on the part of the coroner to give the public the benefit of his scientific skill in the aid of justice, provided only that the physician's natural modesty is conserved by the avoidance of all publicity in the press and courts. This is only what we would expect from the high ethical nature of physicians as a class. Second, the pecuniary reward. This, the coroners say, does not recompense them for the time taken up by adjournments, etc. Thirdly, the advertising. Perish the thought, as there is no ethical principle so strongly insisted upon by the profession as that which says in regard to advertising himself, the doctor must, like Cæsar's wife, be above suspicion.

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The above is but one example of the disgraceful condition the present system of competition for in-

quests has engendered—a condition which ought to be put a stop to with a strong hand; and if the medical profession wishes to keep any reputation for decency before the public, they should insist that the city be divided up into sections, each under the charge of a coroner who would hold all inquests within his jurisdiction. We understand that so disgusted has the Crown Attorney become, that he intends taking steps to remedy this scandalous state of affairs.

Correspondence.

The Editors are not responsible for any views expressed by correspondents.
Correspondents are requested to be as brief as possible.

THE NEW MEDICAL COUNCIL.

EDITOR DOMINION MEDICAL MONTHLY:

"The King is dead. Long live the King." Such is the fate of kings, and such also is the fate of Medical Councils. In the November number of the *Ontario Medical Journal*, the editor sheds a falling tear over the mutilated remains of the old Council, and the next moment he offers up an editorial prayer for the benefit of their successors. This very sudden repentance and daring trapeze tumble by the editor, is near akin to genius, and for official astuteness it might excite the envy of a Toronto alderman. From the origin of the *Journal* down to the present number, the editor has been the unscrupulous ally of the old Council, and as far as his light went, he defended all their insolent and tyrannical legislation. And now that the old Council is defunct, the versatile editor suddenly transfers his alle-

giance to the new order of things. It is hard to serve two masters, and it must be extremely hard to live by extravagant flattery and by abject submission. But there is another surprise in store for the reader. For the editor reaches the very climax of all that is wildly ludicrous, when he ranks himself side by side with Dr. Sangster in literature. This is surely the last stretch of national humor, and if put on the boards as a new comedy, it should draw a full house.

In speaking of the new Council, the editor is pleased to say that, "From our knowledge we are satisfied that the temper of metal will be found hard and accurate, having few cross grains running through it." This strange sentence is a brain-twister. It is noticeable that when the ingenious editor intends to puzzle the readers he has the faculty of presenting his thoughts in a cabalistic form, so occult that the meaning is beyond human comprehension, and sometimes we are half inclined to accuse the learned editor of playing off some literary artifice upon us, merely for his own amusement.

The editor informs us that Dr. McLaughlin "aspired to" the position. This is simply untrue. It was not until after a requisition, signed by over two-thirds of the electors in the division, was presented to him that he consented to become a candidate, and he had good reasons to "feel justified" in acceding to such a flattering request. The doctor is one of the busy practitioners of West Durham, and is thoroughly in touch with the profession, and if the philosophical editor will examine the records and statutes relating to the duties of

Registrars, he will find, in case of small offices, there is no law, human or Divine, to prevent the holders from engaging in other pursuits. We might here recall the editor's mind to his own position, which is somewhat peculiar and scarcely in accordance with law and order. For instance, he takes office from a corporation of which he is a member, contrary to the statutes governing all Her Majesty's responsible institutions. Think of a member of Parliament or even a municipal councillor holding a contract with their respective corporations. They would at once be expelled for breach of independence. Verily, he straineth at a gnat and swallows a Campbell. The editor might also bear in mind that Dr. Day resigned because the law compelled him to do so, and, further, because there was no division in which he could be elected, in any event. So we see that on all points the gifted editor is grievously mistaken, and the stars in their courses seem to be fighting against him. But, fortunately for him, nine readers out of ten will prefer his inimitable power of pictorial narrative to that other faculty of truthfulness, which, it must be owned, has been sadly neglected. But, it is the old experience over again, that all these sudden and violent conversions have an element of instability in them. Apollyon hates to be fooled, and he is apt to stick to the Neophyte till he gets him into trouble one way or another. And now, without being censorious, we might remind the editor that his own position is somewhat peculiar, and is scarcely in touch with municipal law. For instance, he takes a contract from a corporation, of

which he is a member, contrary to Her Majesty's statutes relating thereto. The *Ontario Medical Journal* was foisted upon the profession by the old Council, for a sinister purpose, and as economy is one of the strong planks in the Defence platform, it is just possible that when the new Council meets the *Journal* may stop short, like Grandfather's clock, never to go again. In any event, however, it might be well to keep up the trapeze practice, for the gifted editor may find it necessary to make another perilous leap in the dark.

J. BINGHAM.

Peterboro', Nov. 6th.

[We may say that the *Ontario Medical Journal* has been no extra expense to the profession. Further, it is the official organ of the Council, and naturally represents the views of the majority of that body. For the present we will ask this discussion to close until such time as the new Council meets, and we can have an opportunity of judging whether their platform was to get in on or to stand on.—ED. D. M. M.]

Book Notices.

Temperature Chart. Prepared by D. T. LAINE, M.D. Copyright, 1894, by W. B. SAUNDERS, Philadelphia. Price 50 cents per pad of twenty-five charts.

The most convenient and adaptable thing of the kind with which we are acquainted. Every physician should keep a record of his continued cases in some such graphic form as this. In time it would make a very valuable reference.

Mental Diseases. A synopsis of twelve lectures delivered at the Hospital for Insane, Toronto, to the graduating classes of Toronto University, by DANIEL M. CLARK, M.D., published by Wm. Briggs, Wesley Buildings, Toronto. Price \$1.25.

As the author says the manual is intended for the senior medical student and the busy practitioner who may have no time or opportunity to study the higher and more intricate branches of Psycho-Physics. The Canadian profession is well acquainted with Dr. Clark and his earnest work, and are certainly indebted to him for the manual, which undoubtedly well meets the intention of its author in presenting in a handy and concise form the latest teachings on Psychic Lesions.

Hernia: its Putative and Radical Treatment in Adults, Children and Infants. By THOS. H. MANLEY, A.M., M.D., Visiting Surgeon to Harlem Hospital, etc., etc.

This is a volume of 231 pages, which was published in 1893, by the Medical Press Co., of Philadelphia. Dr. Manley does not favour cutting operations for the cure of hernia in children except occasionally. Neither does he advise indiscriminate operations in adults, as the continuous use of a truss is necessary after the operation. His eulogy of rest, opium and elevation of the hips as means which favour the return of a strangulated intestine is well merited.

The historical review of the treatment of hernia in its different forms is valuable, and shows extensive research.

In operations done for strangulated

hernia, Dr. Manley has obtained a lower mortality where he followed up the reduction with McBurney's operation, than he got previously when nothing was attempted beyond reducing the strangulation.

Dr. Manley is opposed to ether in hernia operations. He states that "total suppression of urine and secondary mortal shock often follow." Neither does he commend chloroform—he prefers cocaine analgesia.

Heaton's hypodermic method is recommended in certain cases.

Full descriptions are given of the operations devised and practised by Reisel, Championniere, McEwen, McBurney, Bassini and other herniotomists of minor fame. But as Dr. Manley properly says, "in all these operations only the walls of the abdomen are dealt with; the visceral element, excess of intestine, an elongated mesentery and intra-abdominal pressure are ignored."

Chapter xxi., on the operative treatment of strangulated hernia, is the most useful to the general practitioner.

Dr. Manley shows a statistical table of fifty-eight cases of different kinds of hernia operated upon, with a mortality of thirteen.

When an operation for the radical cure of hernia is considered desirable, surgeons would do well to study Dr. Manley's valuable monograph.

The Birds of Ontario. By THOMAS MCILWRAITH. Published by Wm. Briggs, Wesley Buildings, Toronto. Price \$2.00.

This volume should certainly be in the hands of all lovers of our

feathered friends. It is the most able compilation extant of the Ornithology of Canada. A great deal of its value is undoubtedly due to the engravings with which the work is illustrated, these being reproduced in a manner more than creditable to the Book Room, whose reputation for turning out the highest class of typographical work is unexcelled.

We are in receipt of advance notice from Messrs. F. A. Davis & Co., saying that they will start the New Year by issuing early in February a companion book to Dr. R. von Krafft-Ebing's famous treatise "Psychopathia Sexualis," entitled "Suggestive Therapeutics in Psychopathia Sexualis," it being a translation of the original by Dr. A. Schrenck-Notzing, of Munich, collaborator with Krafft-Ebing. This book will contain about 325 pages, and be sold by subscription only, at \$2.50 per volume, in cloth. It will be of great importance as an authoritative work on suggestion as a therapeutic agent in the hands of the intelligent practitioner.

THE STUDENTS AND THE TAILORS OF AUSTRIA-HUNGARY.—The *Union Médicale* states that the Tailors' Union of Gratz, in Styria, has addressed to the rector magnificus of the University a request that in future no student shall be accorded the diploma of doctor unless he can show evidence that he has paid his tailor entirely.—*N. Y. Medical Journal.*