when he began to lose flesh and strength, was always hungry, and suffered much from diarrhoea. His legs began to swell, and he gradually became worse, until, finally, he gave up work and came under medical treatment. He had never noticed anything wrong with his water, and did not know that he passed an unusually large quantity. There was no history of syphilis.

On admission, he was found to be much emaciated, his weight being only a little over eight stone. He was curiously apathetic, and rarely volunteered any statement as to his feelings or sensations. On examination of the chest, it was found that there was dullness at both apices, with a little fine crepitation. The bowels were regular, and the motions were passed without difficulty. The urine was always acid, and free from albumen. It contained a large amount of sugar, the quantity passed in the twenty-four hours varying from one to two pounds. His appetite was voracious, and it was difficult to satisfy his hunger. He suffered from time to time from boils, which usually gave a great deal of trouble. His sight was good, and there was no catarract. He had been for some time under the care of Dr. Netherclift, who had treated him with liquid extract of opium with marked benefit.

With the view of giving the Bethesda water a fair trial, it was determined to divide the observations on the urine into four series; 1. Patient on ordinary diet; 2. Patient on ordinary diet *plus* Bethesda water; 3. Patient on restricted diet; 4. Patient on restricted diet *plus* Bethesda water. The result will be seen from the accompanying table.

Date. 1881.	Fluid taken in 24 hours.	Urine passed in 24 hours.	Specific Gravity.	Grains of Sugar in 24 hours.	
May 21	—	250 ozs.	1038	8,000	Acid; no albumen; full diet.
" 22	—	280 "	1039	9,240	
" 23	—	320 "	1042	11,840	
" 24	—	320 "	1038	9,920	
" 25	13 pints	325 "	1028	8,125	
" 26	12 "	355 "	1037	11,360	
" 27	12½ "	320 "	1032	9,600	
" 28	12½ "	450 "	1031	13,050	
" 29	9 "	420 "	1032	11,760	
" 30	8 "	340 "	1035	9,180	
" 31	8 "	410 "	1033	11,480	
June 1	9½ "	350 "	1033	10,150	Full diet, with Bethesda water, from six to eight pints a day.
" 2	11 "	430 "	1036	13,330	
" 3	11½ "	390 "	1035	9,360	
" 4	11 "	400 "	1034	9,600	
" 5	10 "	340 "	1037	9,520	
" 6	10 "	400 "	1033	11,200	
" 7	9 "	340 "	1033	9,180	
" 8	9½ "	280 "	1035	8,120	
" 9	10½ "	310 "	1039	11,160	
" 10	13 "	325 "	1035	9,775	
" 11	13½ "	400 "	1034	11,745	
" 12	12 "	395 "	1035	12,245	
" 13	12 "	400 "	1034	11,600	
" 14	12 "	400 "	1035	12,400	
" 15	20 "	400 "	1030	11,200	Restricted diet, without Bethesda water; bran-bread.
" 16	18½ "	370 "	1035	9,250	
" 17	20 "	400 "	1032	10,400	
" 18	13½ "	270 "	1033	6,480	
" 19	9½ "	190 "	1032	3,990	
" 20	8½ "	170 "	1031	3,740	
" 21	7 "	140 "	1030	2,800	
" 22	9½ "	195 "	1025	2,535	
" 23	6¼ "	135 "	1025	1,890	
" 24	9 "	180 "	1030	3,600	
" 25	6½ "	130 "	1030	2,470	Three oranges.
" 26	6½ "	130 "	1030	1,950	
" 27	6 "	120 "	1025	1,200	Glycerine 3iii from to-day.
" 28	6¼ "	125 "	1025	1,250	
" 29	6 "	120 "	1020	1,440	Restricted diet, with Bethesda water; from five to seven pints a day.
" 30	6¼ "	125 "	1025	1,875	
July 1	5½ "	110 "	1025	1,430	
" 2	6 "	120 "	1026	2,160	
" 3	6¼ "	125 "	1026	1,625	
" 4	7½ "	150 "	1027	1,850	
" 5	10½ "	210 "	1030	3,570	
" 6	8½ "	170 "	1030	3,740	
" 7	10½ "	210 "	1030	3,780	
" 8	7 "	140 "	1031	2,800	
" 9	7 "	140 "	1020	1,540	Gluten bread from to-day.
" 10	10½ "	205 "	1023	2,870	
" 11	9 "	180 "	1020	1,980	
" 12	9½ "	190 "	1026	3,610	
" 13	7 "	140 "	1025	2,940	

1. The average of eleven days of ordinary diet gives 344.5 ounces of urine and 10,323 grains of sugar *per diem*.

2. The average of fourteen days of ordinary diet *plus* Bethesda water gives 375 ounces of urine and 16,670 grains of sugar *per diem*.

3. The average of sixteen days of restricted diet gives 200 ounces of urine and 4,129 grains of sugar *per diem*.

4. The average of twelve days of restricted diet *plus* Bethesda water gives 162 ounces of urine and 2,579 grains of sugar *per diem*.

For the purposes of comparison, however, it would be better to eliminate the first three or four days of each series, and we then obtain a somewhat different result.

1. The average of the last eight days of ordinary diet gives 367 ounces of urine and 10,559 grains of sugar *per diem*.

2. The average of the last twelve days of ordinary diet and Bethesda water gives 365 ounces of urine and 10,493 grains of sugar *per diem*.

3. The average of the last twelve days of restricted diet gives 146 ounces of urine and 2,403 grains of sugar *per diem*.

4. The average of the last eight days of restricted diet *plus* Bethesda water gives 180 ounces of urine and 2,987 grains of sugar *per diem*.

Whilst he was on restricted diet, every precaution was taken to exclude both sugar and starch. Some difficulty was experienced except in the matter of bread, but this was obviated by allowing him first bran-bread, and subsequently gluten-bread. After a time, he suffered greatly from dryness of the mouth and constipation, and it was found necessary to give him a little glycerine—about three ounces a day—which he used for sweetening his tea. The Bethesda water was taken without difficulty; but the patient so rarely gave us any information respecting his subjective sensations, that it was impossible to tell how far they were influenced by treatment. The case unfortunately terminated fatally, the patient dying of acetonaemia. On July 13th, he was found crying and complaining of pain in the stomach. At 2 A.M., on the 14th, he vomited, and complained of headache and of severe pain in the stomach. At a quarter to four, he was violently convulsed, the urine and faeces being passed under him. At 6 A.M. he had another slight convulsive attack, and then passed into a semicomatose condition, in which he died about noon. The *post mortem* examination was made by Dr. Gabbett, who found signs of recent pericarditis, scattered tubercle in both lungs, cloudy swelling in the kidneys, and a fatty liver. It seems probable that the fatal termination of the case was accelerated by the strictness of the dietary adopted; at all events, it was in no way due to the Bethesda water, which deserves a more extensive trial, not only in diabetes, but in Bright's disease. I beg to thank Mr. Batterham, of the Westminster Hospital, for assistance in the examination of the urine.

REMARKS ON ANIMAL VACCINATION.*

By ERNEST HART,

Chairman of the Parliamentary Bills Committee of the British Medical Association.

In the presence of those so intimately and practically acquainted with the subject as Dr. Warlomont of Brussels, and Dr. Martin of Boston, whom we are all glad to welcome to our meeting, it would ill become me to attempt to present a review of the question, were it not that I have been led, in my capacity as Chairman of the Parliamentary Bills Committee of the Association, to devote much study to the subject in its various aspects.

The introduction into the House of Commons, in the session of 1879, of Dr. Cameron's Bill providing for the employment of lymph direct from the calf in cases where parents objected to the use of humanised lymph, led me to devote a portion of my vacation in that year to studying the working of certain of the flourishing animal-lymph establishments in Holland and Belgium. From what I saw there, I was convinced that the same system could be transplanted with success to England, and that there existed no substantial reasons why animal lymph should not be supplied by our English National Vaccine Establishment as well as human lymph. The subject seemed to me, indeed, so important, that I prevailed on Dr. Warlomont to brave the London fogs for the purpose of giving the results of his great experience in the matter before an English audience. You will doubtless all be familiar with the important and weighty conference which assembled in December 1879, under the auspices of the Association, to discuss the question, and to endeavour to bring it within the limits of practical politics. In a report which I prepared for the use of the Conference, I went at length into the history of animal vaccination in different parts of the world, and brought forward evidence to rebut the official objections to the introduction of calf-lymph. Though Mr. Schlater-Booth, whom we first approached on the subject, did not give a favourable reply to our petition, the question was afterwards thoroughly gone into by the Local Government Board; and when Dr. Cameron again brought forward his Bill on June 11th, 1880, Mr. Dodson, who had meanwhile suc-

* Introduction to a discussion in the Section of Public Medicine, at the Annual Meeting of the British Medical Association in Ryde, August 1881.

ceeded Mr. Sclater-Booth, announced that the Government had taken the matter into consideration, and were prepared to undertake the supply of animal lymph as well as that of long humanisation. This concession has, unfortunately, not resulted in anything practical up to the present; since the Board, a year after Mr. Dodson's promise, still reply to inquirers that their arrangements for the supply of animal lymph are not completed. It is difficult to understand why so long a delay has been allowed to take place; but it would be unprofitable, as well as vexatious, to inquire minutely into the causes, since we all know how slow Government offices are to move.

There are two chief questions in connection with this subject to which it may be well to direct attention for a few moments—viz., the practicability of animal vaccination, and its efficiency. On both these points the opinions of the gentlemen who follow me will be of more value than my own; but I think I may fairly claim to have given in my report evidence almost irresistible on the subject.

It has been argued that, however useful and valuable animal lymph may be, its cultivation is a matter of difficulty; that the keeping up of the stock on a series of animals is liable to interruptions; that the lymph does not keep well—and similar objections. It is undoubtedly true that, like everything else requiring care, a certain amount of skill and patience is required for the successful cultivation of calf-lymph; but those who have acquired the dexterity necessary for the operation will tell you that they have no difficulty in keeping up their stocks, and that they are now using lymph obtained by an unbroken series of transmissions through several hundreds of animals. As regards the preserving qualities of calf-lymph, it is generally admitted that, preserved in tubes, its efficacy soon becomes impaired; and all cultivators recommend its collection on points, as being the most certain method.

As to the efficiency of animal vaccination, there can be but little question. Attempts have been made to compare the ordinary current vaccinations by calf-lymph with those performed with human lymph from arm to arm by a specially skilled vaccinator of the highest repute. Fairly compared, animal lymph shows equal, if not superior, results of insertion to that derived from the arms of infants; and as regards its prophylactic power against variola there are undeniable proofs, as Dr. Martin and Dr. Warlomont will tell you, of the very decided advantage which it possesses in this respect. That the lymph manifests greater results on the human system than current lymph, simply shows its greater vaccinal power; and in ordinary cases, the constitutional disturbance is no more intense than it ought to be in typically perfect vaccination.

In this connection, some statistics with which I have been favoured by Dr. Carsten of the Hague (who has written to me expressing his regret at his inability to be with us) are both interesting and instructive. They show not only the very small proportion of failures which now attends the performance of animal vaccination at the various stations in Holland, but also the steady improvement which has been manifested since the lymph was first used.

In 1869, when animal vaccination was begun at Rotterdam, there were 67 failures out of 542 operations; last year (1880), there were only 4 failures in 2,727 operations, whilst in as many as 1,563 of these the full amount of ten vesicles was obtained. At Amsterdam, there were 19 failures in 1870—when animal vaccination was started—out of 626 operations; whilst during the last six years there has been but one single failure out of a total of 14,849 operations! Similar experience comes from the Hague, Utrecht, and Haarlem; and the gross total of all the vaccinations performed in Holland with animal lymph, including all the earlier efforts, shows that out of 60,754 operations, only 720, or little more than one per cent., have been unsuccessful. Testimony such as this, and on so large a scale, shows indisputably that the allegations made against the taking power of calf-lymph have no foundation in fact. The proportion of failure last year was indeed only 0.3 per cent.

There is but one other point to which I should wish to refer, and that is the undoubted advantage which animal vaccination possesses in its freedom from the suspicion of being concerned in the possible inoculation of syphilis into the human body. If for no other reason than this, its use ought to be encouraged. On the subject of the possible inoculation of syphilis, a variety of opinions have been expressed in this country and abroad, and it could serve no useful purpose to attempt to discuss them at the present moment. But, however much opinions on this point may differ, there is a general agreement in recommending the cultivation and official recognition of calf-lymph as a means of calming the apprehensions (however ill-founded) of parents as to the qualities of the virus used. The counter objection, that calf-lymph may be the means of inoculating the vaccinated person with animal diseases, hardly needs serious discussion. On this point, and on the one of which I have just spoken, I may appropriately quote the words

of my excellent friend Dr. Dompeling, the accomplished director of the Utrecht vaccination station, contained in an appendix to an edition which he has published, in Dutch, of my little book on the *Truth about Vaccination*. Dr. Dompeling, speaking of the possibility of communicating the syphilitic virus by vaccination, says:

"This guardian angel of mankind would have its lustre darkened, were we not fortunate enough to possess a means whereby we can avoid the danger, and guarantee it against all spot or blame: I refer to the use of animal vaccination—that is, the inoculation of matter originally derived from the cow and communicated to the calf, and which has never passed through the human body. In Holland, *parcs vaccinogènes* have been already for several years in operation. That in Rotterdam was established in 1868; then followed the Hague, Amsterdam, and in 1873, Utrecht; and subsequently several other towns. Many thousand persons have been vaccinated with animal lymph; and preference is more and more given to this method. It seems as if the objections (even the conscientious objections) against vaccination were beginning to give way, and people were more willingly induced to submit themselves to this salutary treatment.

"The advantages of this kind of institution, of which there has even been one in Japan since 1874, are great, because as much vaccine matter can be produced at any time as is necessary, simply by inoculating more calves; and this is of the greatest importance in times of epidemics of small-pox, or in such a panic as we experienced last summer. Erysipelas, which appears often to occur as a result of human vaccination, is, according to Dr. H. A. Martin of North America, and also our own observation, very seldom seen. The mishaps are rare, and the results most excellent. Whether the protection afforded against small-pox is as good as, or better than, that resulting from humanised lymph, time must teach. Even if the principle of immediate connection between a number of good cicatrices, and protection against small-pox, is to be established, this can only be shown by time; but we may with reason wait for this.

"Has, then, animal vaccination no dark side? We do not know. It has several times been asked whether any morbid matter can be communicated from cattle to man by animal vaccination. In the first place, that horned cattle are liable to syphilis is most strongly denied by, amongst others, Depaul, who has collected evidence on the subject, and by Ricord. Veterinarians are of opinion that, in opposition to the horse, in which some diseases are both difficult to distinguish, and are really capable of being communicated to man, so that no use can ever be made of inoculation from it, the diseases which occur in calves and heifers are on the one hand not capable of being communicated, and on the other hand have such distinctive characters, that no one who is not exceptionally thoughtless or careless would make use of an animal so diseased. Besides, even in slight maladies, such as diarrhoea, the development of the pock is hindered, and it is formed imperfectly, or not at all. To render precaution complete, it is servicable to have a veterinary surgeon attached to every *parc vaccinogène*, as has been the case in Utrecht since the establishment of the institution, which is an annex to the veterinary school; this leads to security in the genuineness of the lymph, which is taken exclusively from calves, and, just as in the other *parcs vaccinogènes* in our country, has been originally transmitted from the cow, and has never passed through a human body."

I would conclude in the words of Dr. M. Hay of Vienna, who says: "Animal vaccination belongs to the future. Its general use as far as possible—a gradual substitution of it for human lymph—should be the aim of all who see in vaccination one of the most happy discoveries of preventive medicine."

CENSUS OF MEDICAL PRACTITIONERS IN THE UNITED STATES OF AMERICA.—In the annual report for 1879 of the Commissioner of Education, Gen. John Eaton, just published, the following statistics are given. "According to the census of 1870 there were, nine years ago, 62,383 physicians and surgeons in the country. The number of graduates reported to this office since 1873 is as follows: 1873, 2,391; 1874, 2,343; 1875, 2,491; 1876, 2,629; 1877, 2,911; 1878, 3,080; 1879, 3,271; or a total in the seven years named of 10,016. If to this number we add 2,000 for each of the years 1870, 1871, and 1872, a low estimate, we have 25,000 additions to the profession in ten years. This is much in excess of any proportionate increase in the population of the country and far beyond the loss by death in the profession. When we think of the numbers added without graduation, and even without preparation, the increase becomes appalling."—*New York Medical Record*.