Dr. BURGESS also described a case of sudden glottic spasm with apparent asphyxia, relieved after six hours of artificial respiration, and followed by the rash of measles. Other speakers mentioned instances of the onset of exanthemata with convulsions. *Ernest Waggett.*

## BRITISH MEDICAL ASSOCIATION.

*Meeting*, 1895. ("Brit. Med. Journ.," August 24th, 1895.)

*President*—Dr. PAVY.

### SECTION OF MEDICINE.

ABSTRACT OF DISCUSSION ON DIPHTHERIA AND ITS TREATMENT BY ANTITOXIN.

Dr. SIDNEY MARTIN: The author defined diphtheria as a membranous inflammation of a mucous membrane, due to the invasion of the bacillus diphtheria, which did not enter the body, but formed poisons in the membrane, which were absorbed and produced general symptoms—fever, etc., as well as palsy, due chiefly to nerve degeneration. The pathological test of diphtheria was nerve degeneration. In the majority of fatal cases, death was due to the effects of the poisons in combination with (1) mechanical obstruction, or (2) broncho-pneumonia, or (3) mixed infection,—the poisons producing syncope, suppression of urine, asthenia, or paralysis.

Two classes of chemical poisons were to be distinguished in this disease: one present in the membrane, the other in the tissues, blood, and spleen.

The first might be precipitated from a saline extract of the membrane by means of alcohol. Intravenous injection of a minute quantity of the precipitate into a rabbit produced slow paralysis, wasting, diarrhœa, and sooner or later death, *post-mortem* examination showing degeneration of nerves and fatty degeneration of skeletal and heart muscle. A single infinitesimal dose, therefore, produced the pathological changes of diphtheria, suggesting that it belonged to the class of ferments.

The second class, to be obtained from the blood, etc., included special albumoses and an organic acid. The latter produced some nerve degeneration, but no progressive paralysis. The albumoses, similar in reaction to the albumoses of digestion, had peculiar toxic properties.

Injected intravenously they produced in one or two hours a rise of temperature, which could be maintained by repeated injections. Large doses might cause death, or extensive degeneration of nerve and heart muscle; but the characteristic of their effect lay in the fact that they produced palsy only in multiple doses, unlike the ferment, or toxin so-called. Whereas the toxin produced necrosis when injected subcutaneously, the albumoses produced merely œdema. The fatty degeneration of the heart,

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found also in poisoning by anthrax and septic cocci where no ferment was produced, was probably therefore due to the albumoses, and not to the toxin directly.

These various poisons might be produced in vitrio. The ferment or toxin was obtained by cultivation of the bacilli in an air current, in alkaline broth with seventy-five per cent. of salt, containing peptone two per cent). A minute single dose, after filtration, given intravenously, caused the nerve degeneration characteristic of diphtheria. On the other hand, if alkali albumen was substituted for the peptone in the broth, the albumoses with the specific action described above were formed, together with the organic acid.

The author concluded that the ferment secreted in the membrane was absorbed into the body, and there produced by its action on the proteids certain products of digestion—albumoses of specific toxic quality. The body was poisoned, not by a single large dose, but by numerous small doses gradually producing their effects.

With regard to the antagonistic effect of antitoxin to these poisons, the nerve and heart muscle degenerations in the rabbit afforded a delicate test.

Injection of antitoxin alone produced no ill effect whatever.

The author then gave details, with chart, of an experiment demonstrative of its antagonistic reaction to poisoning by toxin.

A rabbit receiving toxin at once rapidly lost weight, became paralysed, and died on the sixth day. A second, receiving an equivalent dose of antitoxin, had no untoward symptoms, and after slaughter on forty-first day showed a certain amount of nerve degeneration (the dose of antitoxin was therefore not sufficient), but no degeneration of heart muscle. The first rabbit, *post mortem*, displayed marked fatty degeneration of heart muscle, as well as nerve degeneration.

In an experiment dealing with the counteracting of large repeated doses of albumoses, the rabbit receiving no antitoxin became paralysed, and showed marked fatty degeneration of the heart and nerve degeneration ; while the second, receiving antitoxin as well as albumose, remained lively and well, the heart showing no fatty degeneration, and nerve degeneration only to an insignificant extent.

The antitoxin proved to have but slight effect on the rise of temperature due to albumose.

Dr. GOODALL : The symptoms characteristic of severity in a case were extensive exudation, persistent exudation, frequent pulse, albuminuria, pyrexia, adenitis, drowsiness ; and these were toxic symptoms. Still graver symptoms were—frequent vomiting, anuria, hæmorrhagic condition, convulsions ; the last a sure sign of approaching death. Anuria, either partial or complete, and usually preceded by albuminuria, and accompanied by progressive cardiac failure, might occur in patients apparently doing well. These symptoms were brought prominently forward because some observers had attributed them to antitoxin.

Comparative statistics were given, showing that among a series of 105 cases (relatively severe on the score of age and type of disease) treated with antitoxin, the mortality was at the rate of 22·8 per cent., as

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against a rate of 33 per cent. in 136 cases not so treated; and, taking cases of under ten years of age, as 24·4 per cent. to 39·2 per cent. With regard to incidence of albuminuria, antitoxin treatment gave 53·3 per cent. (9 anuria), against 49·2 per cent. (12 anuria) not so treated. Nephritis was not observed in one of the 241 cases. With regard to paralysis, antitoxin gave 17·1 per cent. against 14·7 per cent. Paralysis followed severe cases more frequently than mild ones. Treatment, therefore, which enabled patients to survive the membranous stage was conducive to an increase in the paralysis percentage.

Dr. ALEXANDER JOHNSTONE considered that the disappointing results of antitoxin treatment might be explained on the supposition that the processes concerned were more complicated than could be attributed solely to Klebs-Loeffler bacillus and its chemical products. The results, as far as they went, were favourable to the use of the remedy, but nothing striking was to be expected.

Prof. Dr. VON RANKE (Munich) spoke strongly in favour of the antitoxin treatment, giving statistics of a series of 163 cases. The percentage of deaths, 17·7 per cent. (or 18·8 per cent. in those proved bacteriologically), was considerably less than half of those of eight previous years. In cases of laryngo-stenosis the mortality was nearly half that of former years, and in not a single case did laryngo-stenosis supervene after injection. Moreover, in 28·4 per cent. of undoubted diphtheritic croup the stenosis subsided, as against 5 per cent. formerly. Under the serum treatment the disease lost its progressive character.

Mr. LENNOX BROWNE desired to deprecate the suggestion that he was adverse to the serum treatment, but stated that he was anxious for truly critical investigation. He contended that Dr. Sidney Martin's experimental results as to nerve and cardiac muscle degeneration were not borne out at the bedside. With regard to nutrition, moroever, it had been shown that serum, whether antitoxic or normal, was prejudicial. Parenchymatous changes in the kidneys were almost constantly found, *post mortem*, in antitoxin cases; but the importance of this point was minimized by the observation of Dr. Woodhead that the kidneys were, in some degree, affected in all cases of diphtheria. It was said that antitoxin was not suitable for mixed cases, and Dr. von Ranke had found pure culture of Klebs-Loeffler bacillus in but 12 out of 163 cases. Finally, at the North-Western Fever Hospital, under the favourable circumstances there existing, the mortality during 1894 had been but 27 per cent.—exactly the same as the first 100 cases treated with antitoxin.

Prof. Dr. A. BAGINSKY (Berlin) had found the percentage mortality reduced from 41 per cent. to 15·6 per cent. under the serum treatment, and gave figures showing that, at all ages under ten, the rate was more than halved. In every respect, moreover, the condition of the patients was much benefited, laryngeal obstruction commencing in no case (in a series of 525) after injection.

Dr. SIMS WOODHEAD considered that in England the serum was not given in sufficiently large doses. One of the most important effects produced by the treatment was an alteration in the type and course of the disease, with less tendency to complications.

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Dr. HERMANN BIGGS (New York) stated that the death rate in New York from diphtheria had been reduced by over 40 per cent. by antitoxin treatment. He spoke highly of the immunizing power of the serum. In an institution in which 107 cases had occurred in 108 days, only one mild case occurred in the first thirty days after injection of 200 units of Behring's preparation in all persons exposed to infection. One case occurred during the subsequent thirty days and five cases shortly after this. Two hundred and twenty-five units were then injected, and no more cases occurred. In three other institutions similar results were obtained. No unfavourable symptoms occurred in any of the 800 persons injected.

Dr. CAMPBELL HALL spoke in recommendation of the treatment by antitoxin.—*Abbreviated from "Brit. Med. Journ."* *Ernest Waggett.*

## SECTION OF PUBLIC MEDICINE.

*President*—ERNEST HART, D.C.L.

### A DISCUSSION ON THE DIAGNOSIS OF DOUBTFUL CASES OF DIPHTHERIA.

E. KLEIN: The opener began by giving details of the microscopic appearances and culture phenomena of the Klebs-Loeffler bacillus, remarking incidentally that he was unable to recognize a definite relation between the length of the bacilli and the severity of the cases. As a rule, n typical cases the bacilli were found abundantly, or even in pure culture.

In a second class, clinically and epidermiologically true cases of diphtheria, the bacilli were swamped by immense quantities of other microbes, and in these cases the bacilli were often not found in culture until repeated careful search had been made.

In a third class, bearing no obvious evidence in their history or primary symptoms, correct diagnosis was of the utmost importance. Such diagnosis was often extremely difficult owing to scarcity of the bacilli. In these cases the author employed a new method of plate cultivation. The suspected exudation was rubbed gently over the surface of the agar, which had been previously allowed to solidify, and which was subsequently incubated at 37 degrees C.

Next day cover-glass impression specimens—taken, if necessary, from the entire number of colonies present—could be examined microscopically. In this manner positive evidence has been obtained where repeated tube cultivations had proved negative.

In a fourth class, of membranous sore throats, no bacilli were to be found in the exudation, which contained no fibrinous matrix. Such cases were recognized as pseudo- or cocco-diphtheria.

The culture test was of great importance in cases seen after disappearance of membrane, and in healthy persons exposed to infection. The results of inoculation experiments on the guinea-pig were then detailed, the author remarking that no definite relation existed between the virulence of the culture, as so tested, and the severity of the original

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case. With regard to the existence of transitional states between pathogenic and non-pathogenic bacilli, the author withheld his judgment for the time being. Those bacilli which morphologically and in respect of culture were typically diphtheritic, had pathogenic action; while those which were non-pathogenic, though resembling the bacilli morphologically, showed some differences in cultural respects.

The results of inoculation, coupled with the identity of poisonous products obtained by culture with those found in the human subject, as determined by Sidney Martin, enabled us to say that the Klebs-Loeffler bacillus was the true cause of diphtheria.

Dr. HERMANN BIGGS (New York) recommended examination in healthy persons exposed to infection, with a view to isolation or immunization, according to the result. He also recommended examination in cases of throat inflammations and of convalescence from diphtheria. He described the technique and experience gained from 25,000 cultures.

Dr. GOODALL spoke of the sources of error, and considered that, as return cases were rare, it was unnecessary to keep patients in hospital more than six weeks if perfectly recovered.

Dr. UNDERHILL desired to know if cases clinically healthy, though bacilli were detected bacteriologically, should be notified as diphtheritic; and whether in such instances isolation was necessary until the bacilli disappeared. An attack appeared to afford no protection.

Dr. HERMANN BIGGS, in reply, stated that isolation was maintained in New York until disappearance of bacilli.

Dr. KLEIN, in reply, repeated his statement as to the long and short variety of bacilli. He preferred for examination a piece of membrane or simple scraping, to the results of swabbing.—*Abbreviated from "Brit. Med. Journ." Report.* *Ernest Waggett.*

## THE HUNGARIAN OTOLOGICAL AND LARYNGOLOGICAL SOCIETY.

*Meeting, 17th October*, 1895. ("Monatschrift für Ohrenheilkunde.")

Dr. ZWILLINGER. *Foreign Body in the Nose for Eight Months; Fœtid Purulent Discharge; Asthma.*

J. B., aged fifty-seven, presented himself on the 5th August, 1895, complaining that on the 12th of December, 1894, his nose had been plugged on account of epistaxis, and that neither the doctor who applied the plug nor others whom he had consulted since had been able to remove it. It caused extreme pain and difficulty of breathing, and emitted so objectionable a smell that people avoided him.

On anterior rhinoscopy the left nostril was seen to be filled with pus. The mucous membrane was a dull bluish-red in colour, much swollen but no foreign body was visible. By means of the probe, however, an

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