Report of the Scientific committee appointed by the Royal medical & chirurgical society to investigate the relations between membranous croup and diphtheria.

MEMBRANOUS CROUP
AND
DIPHTHERIA

The Discussion of the Report on Croup and Diphtheria will take place at the Meetings of the Society on April 8th and 22nd next.

E. W. Goodall.

REPORT

OF THE

SCIENTIFIC COMMITTEE

APPOINTED BY THE

ROYAL MEDICAL & CHIRURGICAL SOCIETY

TO INVESTIGATE

THE RELATIONS BETWEEN

MEMBRANOUS CROUP

AND

DIPHTHERIA.

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1879.

REPORT OF THE SCIENTIFIC COMMITTEE

APPOINTED TO INVESTIGATE THE RELATIONS OF

MEMBRANOUS CROUP AND DIPHTHERIA.

In presenting their report the Committee desire to draw attention to the manner in which the inquiry has been conducted, and the materials upon which their conclusions are based.

At the outset of the investigation it seemed to the Committee desirable that the experience of the Fellows of the Society should, as far as possible, be gathered, and their opinion sought as to the distinctions to be drawn between "diphtheria" and "croup." Their aid was also sought in the view of discovering other reliable sources of information which might be placed at the disposal of the Committee.

With this view a series of questions were framed, a copy of which was sent to each Fellow of the Society, and also to such other members of the profession as were known to take an interest in, or to have had special opportunities for, the investigation of the subject. About 700 copies were issued, and to these 90 replies were received.

A large mass of information was thus collected, and the results of observation of a large number of the most experienced and respected members of the profession in all parts of the world was gathered, and in addition to the formal replies

to the queries, a number of pamphlets, letters, &c., containing information were sent.

A digest of these replies, and a critical summary of them, are appended to the report.

It was, however, felt by the Committee that the results thus gained, though of great value, would be an insufficient basis for so full a report as the subject demands. In many cases opinions only were given without any statement of facts, and a considerable number of important points involved in the inquiry remained without any reply.

It was, therefore, resolved that a fresh series of questions should be issued, stating certain definite points upon which the Committee desired information, and that a request should be made for the communication of any facts or cases bearing upon these subjects.

Moreover, the experience of the members of the Committee was called in aid, and the data afforded by the large metropolitan hospitals were as far as possible collected. The more important of these have been arranged in a tabular form and are appended to the report. They constitute one of the most important bases of the conclusions arrived at by the Committee, and it is believed that they will form a not unimportant contribution to the known facts upon the subject.

The Committee have also been enabled to make use of the recent reports of inquiries made under the direction of the Medical Officer of the Local Government Board into epidemic and endemic diphtheria, and have derived much information from them; and they have to thank the Medical Officer of the Local Government Board (Dr. Seaton), and the Assistant Medical Officer (Dr. Buchanan), for their courtesy in the matter.

Other materials, such as records of cases, specimens of false membrane, and of the larynx, &c., from cases of membranous exudation have been received from various quarters, and have been examined by members of the Committee deputed for that purpose.

Reports upon the early history of the subject and of inves-

tigations into the morbid anatomy of the diseases in question have also been prepared, and are appended. A report upon the microscopic anatomy of all the cases which have been available is also added.

Although the Committee feel that there is yet much to be investigated before any final conclusion can be reached as to the etiology of membranous exudation in the larynx and trachea, they believe that upon some, at least, of the various questions involved in the subject some light will be thrown by their labours.

Object and Scope of the Inquiry.

The object of the inquiry may be briefly defined as the determination of the disputed question, whether there is such a disease as "idiopathic membranous croup," *i.e.* whether membranous laryngitis exists independently of the diphtheritic poison, and whether, if so, there are any criteria by which it can be distinguished clinically or pathologically.

Two distinct branches of the inquiry are thus opened, viz. whether other causes than the process generated by the diphtheritic poison are capable of giving rise to membranous exudation in the larynx and trachea; and whether it is found in practice that such cases occur with sufficient definiteness and frequency to rank as a separate disease. For it is clear that if it can be shown that other causes than the diphtheritic poison are capable of producing membranous exudation in that position, the solely diphtheritic origin of membranous laryngitis must be abandoned. Yet there would remain the questions whether the other causes were not so rare as to be inconsiderable, and whether the morbid product in the two cases was identical.

It may be stated, *in limine*, that there is evidence before the Committee that membranous exudation in the air-passages can be produced by mechanical and chemical irritants apart from the contagious diphtheria; and that a few cases exist in which there is some evidence that membranous laryngitis has followed exposure to cold. It will, however, be seen

that in a large number of cases some other factor must be invoked as a cause apart from or in addition to this, either a morbid systemic condition due to the presence of some constitutional or febrile disorder, or insanitary surroundings, or some other cause not apparent. But there is strong evidence that all the cases thus produced do not fall under the head of contagious diphtheria, and that there are classes of cases distinct from that disease.

Before entering more particularly into these several questions some points may be stated which have embarrassed the investigations of the Committee, and have rendered some of their conclusions only presumptive.

One of the most important of these is the anomalous position which diphtheria holds in the rank of zymotic diseases, and the difficulty of defining precisely what is and what is not diphtheria. It is at present an undecided question whether diphtheria is as distinct and definite a disease as scarlet fever or smallpox, and whether its poison is not readily generated under conditions of foul air and decomposing sewage. The position of diphtheria in this respect is even more undecided than that of enteric fever, and there is still stronger evidence that it may be originated *de novo,* and produce cases which are contagious, and give rise to epidemics. The recent investigations made by the Medical Inspectors of the Local Government Board tend in this direction, and seem to show that diphtheria has a very close relationship with enteric fever in the causes which favour its origin and spread, and its incidence in particular localities either before, after, or together with that fever. The question may therefore be raised whether the sporadic cases of membranous laryngitis which occur apart from the possibility of contagion are not diphtheritic. This latter question could only be decided in the negative by showing that such cases are essentially distinct in their pathology and symptoms from diphtheria, or that they do not possess the property of contagion, or, again, that they are due to the same causes as cases of non-membranous laryngitis; and these points will require further notice.

A large part of the knowledge which we possess on the subject of diphtheria is derived from the study of epidemics, and is open to the objection that in many cases it refers to the more virulent and graver forms of the disease. There can be no question that diphtheria may assume an epidemic form, and that during particular epidemics it may be especially malignant, or may have some particular character, or be followed in a large proportion of cases by certain sequelæ, and that these vary in prevalence in different epidemics.

We know, also, that in large towns diphtheria, like nearly all other specific contagious diseases, is constantly prevalent in a sporadic form, and that it may be endemic in certain localities, even in particular houses and rooms, in which cases occur at long intervals of time, and the disease may thence be spread as isolated cases, or may, from time to time, give rise to a local or general outbreak.

It is clear that these facts to a certain extent embarrass the inquiry in two ways. It may not be justifiable to take the epidemic form of the disease when it affects the larynx as the type with which to compare the sporadic cases of membranous laryngitis, either as regards the symptoms or the sequelæ, seeing that both are evidently largely modified by unknown conditions.

The second difficulty is still more serious, viz. the constant existence of diphtheria in large towns and even in certain centres in country places, and the very great difficulty in tracing the contagion in many cases which are undoubtedly specific as judged by their symptoms and the property of contagion which they possess.

Although the poison of diphtheria is not generally regarded as so contagious as that of most of the specific fevers, there is abundant evidence that within certain limits and under certain conditions it is very highly contagious, and may be conveyed by the most unsuspected channels. (See, for example, a case of conveyance by a pillow in Dr. Thorne's report on the Andover outbreak. Report of Medical Officer of Local Government Board.)

The fact that whilst diphtheria may be very contagious,

especially to certain individuals, yet in some cases manifests no tendency to spread, renders any inference drawn from contagion alone very doubtful. In a very large number of cases the contagion cannot be directly traced; hence the Committee have not felt justified in any given case in excluding the possibility of contagion.

But they have attached some importance to the fact that in a certain class of cases of membranous laryngitis there appears to be much less frequent spread of the disease in a hospital ward than from cases of ordinary recognised diphtheria. (See Dr. Fagge's report in 'Guy's Hosp. Reports, vol. xxii, 1877.)

In the investigation the following points have been taken up in order:

1. The known causes of membranous laryngitis and their relative frequency.

2. The conditions of occurrence as regards association with other diseases, and as to climate, season, and general hygienic conditions.

3. The possible distinctions between classes of cases as regards—

1°. General course.
2°. Symptoms.
3°. Anatomical distribution of the false membrane.
4°. Morbid anatomy—local.
5°. Morbid anatomy—general.
6°. Histological characters.
7°. Sequelæ.

1. *Causation.*

It is generally admitted that amongst the causes of membranous exudation in the air-passages the poison of the contagious and occasionally epidemic diphtheria holds a first rank, and that there is a laryngeal form of the disease in which the morbid process is entirely limited to the larynx and trachea.

The point before the Committee only refers to the cases

in which the false membrane is limited, or almost entirely limited, to the larynx and trachea, and it is disputed whether such cases do frequently arise from diphtheritic contagion.

The evidence before the Committee is conclusive as to the fact that in epidemics of diphtheria cases do occur in which the false membrane is thus limited, but it appears from the facts collected that in recorded epidemics such cases are exceptional. Bretonneau stated that he had met with but two instances of this kind, the proportion being one to thirty cases of diphtheria in general. Guersant puts the relative frequency of a primary laryngeal diphtheria at one in twenty cases. In an epidemic which occurred at Auchtergaven, in Perthshire, Dr. Yeats found that among 183 cases of diphtheria there were fifteen in which laryngeal symptoms were present from the commencement, but in which there was no visible affection of the fauces when they were first brought under notice, and in six of them the pharynx remained free throughout the whole progress of the disease ('Edin. Med. Journal,' 1876). The ratio was therefore exactly that which Bretonneau gave so many years before. In a report on an epidemic of diphtheria at Great Coggeshall, Dr. Thorne[1] found that only eight cases out of 180 took this form. Six of these cases were three years of age or under. Nor even in these cases was the possibility of the coexistence of some false membrane in the fauces excluded, for the cases occurred at the outset of the epidemic and their diphtheritic origin was not recognised until later, and no post mortem was made.

From these and other facts it would appear that the frequency of a purely laryngeal form of epidemic diphtheria has been somewhat over-rated.

It need hardly be said that the number of cases in which membranous laryngitis arises from mechanical or chemical irritants, boiling water, and the like is very small, and can hardly enter into statistical consideration. If, therefore, it is shown that in the experience of hospitals a large number of cases are met with in which the false membrane is entirely limited to the air passages, the probability is that some

[1] Report to Medical Officer of Local Government Board, April 11th, 1877.

other condition than contagious diphtheria has been concerned in the production of some of them. They should also if all diphtheritic bear some proportion to the number of grave cases of diphtheria met with.

The tables contributed by Dr. Dickinson, Dr. Hilton Fagge, and Dr. Gee, give some facts which bear upon this point.

Dr. Dickinson's tables give the following results:—In 66 cases of croup and diphtheria—

Membranes in fauces, &c., only	15
In fauces and air-passages (in 10 of which much, in 13 a small quantity only, of false membrane was present in the fauces)	23
In air-passages only	9
Laryngitis, no membranes discovered	19

Dr. Gee's tables:—Out of 76 cases clinically "croupal"—

False membrane was found in the larynx and fauces in	42
In the larynx or trachea only in	21
No membranes discovered	13

Dr. Hilton Fagge's tables:

Membrane in fauces only	22	
Marked in the fauces and larynx	25	34
Slight in fauces and in larynx	9	
Larynx only	18	
Laryngitis without false membrane discovered	11	
Membranous laryngitis directly caused by local injury	7	

	Dr. Dickinson.	Dr. Fagge.	Dr. Gee.	Total.
Membranes in fauces only	15	22	—	—
In fauces and larynx	23	34	42	99
Larynx and trachea only	9	18	21	48
Laryngitis, no membranes discovered	19	11	13	43

It would appear from these statistics that there is a very large proportion of cases of membranous exudation in the larynx and trachea as compared with those in which faucial exudation existed alone, and it is noteworthy that there is also a very high proportion of cases of implication of the larynx where there was also faucial exudation, far larger than in any known epidemic of diphtheria.

If we rely upon these statistics alone, we may be led to conclude that a large proportion of cases of exudation in the fauces and air passages together, as well as those of exudation in the air passages alone, are not of diphtheritic origin, as judged by the ratio to the cases of diphtheria free from laryngeal implication. But it is evident that such a conclusion could hardly be warranted by these facts alone, for it must be borne in mind that only the more severe cases, and especially those with laryngeal affection, are brought to hospitals. Too much importance must not therefore be attached to those figures alone, apart from a stricter investigation of the individual cases.

The importance of the ratio of the cases of laryngeal implication is also probably modified by the fact that the greater part of the observations here referred to were made in children's hospitals, and that laryngeal implication appears to occur with greater proportional frequency in children.

Whilst referring to the modified conditions in hospitals, which render a comparison of the statistics of hospital experience with that in families or public institutions somewhat questionable, we may observe that the absence of contagion from hospital cases by no means proves their non-contagious nature. For, although a few cases arose in hospital of those here tabulated, only a very small proportion did so, the number of cases of ordinary pharyngeal diphtheria so arising being inconsiderable. This being so with cases in which the pharynx as well as the larynx was involved, and of which the diphtheritic origin was shown in other ways, it is probable that the number of cases arising by contagion from the purely laryngeal form would be in a still smaller ratio. It is not absolutely proved that contagion is less ready from the purely laryngeal form, but known facts render it probable that it is so. Hence any inference from the proportional infrequency of infection from different classes of cases in which laryngeal membranous exudation is present from whatever supposed cause, must, to some extent, be received with caution.

2. *Conditions of occurrence.*

As to the predisposing and exciting causes of membranous laryngitis, they may be grouped as determining the affection of the larynx where contagion is present, and as giving rise to it apart from contagion.

Upon these points the Committee have received but little exact information. Many of the causes which have been described as giving rise to membranous laryngitis are known also to favour the affection of the larynx in cases of epidemic diphtheria.

The influences of *age* and of *weather* are two of the most important of these causes which have a twofold action.

Season, weather, and climate.

Some of the evidence given under this head has been mentioned in the analysis of replies to questions (see Appendix), and beyond the fact that variable climate and cold wet weather favour the onset of laryngeal symptoms, no fact of importance was elicited.

Dr. Yeats especially mentions this fact in his report on the epidemic at Auchtergaven.

In the report on the Coggeshall epidemic all the ten cases of laryngeal affection are shown to have occurred in December, November, and January, when also there was much wet and an unusually low temperature. So far as *season* is concerned the most exact facts are those collected by Dr. Dickinson, Dr. Fagge, and Dr. Gee, which are appended.

Laryngeal with faucial exudation :

	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Dr. Dickinson	24	2	1	1	1	4	5	1	1	2	0	5	1
Dr. Fagge .	35	1	1	4	3	1	1	4	6	5	5	3	1
Dr. Gee . .	42	3	2	5	4	0	6	4	6	3	3	4	2
Totals .	101	6	4	10	8	5	12	9	13	10	8	12	4

Laryngeal only :

	Total.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Dr. Dickinson	9	0	4	1	1	0	2	1	0	0	0	0	0
Dr. Fagge .	19	4	0	3	0	1	3	2	1	1	2	1	1
Dr. Gee . .	21	1	1	3	4	2	1	0	0	3	2	4	0
Totals .	49	5	5	7	5	3	6	3	1	4	4	5	1

Laryngeal symptoms ; no false membrane :

Dr. Dickinson	19	1	1	2	1	4	1	0	2	0	0	4	3
Dr. Fagge .	12	2	2	3	1	0	0	1	1	0	2	0	0

Faucial diphtheria :

Dr. Dickinson	15	1	2	0	1	2	2	3	0	0	1	1	2
Dr. Fagge .	(Figures valueless, because of small number of cases, and fact that several arose from one another.)												

Hygienic conditions.

This question is one too wide for discussion here ; the facts with regard to it especially relate to the origination of diphtheria *de novo* or its spread. The only special points with regard to membranous laryngitis as such are given in the analysis of replies to queries. Dr. Dickinson's notes to his table also contain an important observation.

In the Reports to the Medical Officer of the Privy Council and Local Government Board, some further facts are stated, which appear to show that unhygienic conditions which give rise to outbreaks of enteric fever also originate diphtheria.

Age.—There can be no question that membranous laryngitis, whether of proved diphtheritic origin or not, is chiefly a disease of infancy and childhood. This is a fact so completely established by all experience that it is hardly needful to quote facts in its support.

Out of 25 fatal cases of over 180 known attacks of diphtheria in the Great Coggeshall outbreak, only 3 cases were over seven years of age, 3 were seven years, 2 six years old ; all the rest were younger, and of these 17 cases 10 are dis-

tinctly stated to have died with laryngeal symptoms, which were present, so far as can be ascertained, in none of the others.

Of 22 cases of purely faucial diphtheria, collected by Dr. Fagge from the records of Guy's Hospital, only 2 were under seven years of age; in one of these (Case 1) there is great probability that there was membrane in the larynx (the "breathing" was "obstructed"); the other case was not followed till the end, the child being removed from the hospital. Whilst out of 24 of marked faucial and laryngeal exudation, 14 cases were under seven years of age, as was also every one of the 10 cases of marked laryngeal with slight faucial or tonsillar affection. These facts are of especial importance as evidence, because of the very large number of persons over ten years of age in a general hospital.

This very fact, however, renders it necessary, for fair comparison, that all those cases in which the disease was caught in the hospital should be excluded, namely, 7 of the first group and 4 of the second group, all of these being adult patients.

Moreover, others of this first group can hardly be retained, since it is doubtful whether they are really cases of diphtheria at all. The result is that, among eight patients admitted with purely faucial diphtheria, there were only two children, whereas among thirty patients in whom the air-passages as well as the fauces were attacked, there were no less than twenty-four children under seven years of age.

Dr. Dickinson gives 5 cases of non-laryngeal diphtheria under seven years of age, but all the rest were laryngeal alone or combined.[1]

Sex.—As to sex, no special influence can in any way be traced.

[1] The majority of cases in the Hospital for Sick Children, Great Ormond Street, are from two to ten years of age; some of the cases, however, occurred in nurses, others at St. George's Hospital.

Association with other diseases.

The relation of contagious diphtheria to epidemics of other diseases is elsewhere discussed (see note to answers to queries); it has no special bearing on the question of membranous laryngitis.

The occurrence of membranous exudation in the fauces and larynx during or after the attack of the disease is one which has been frequently noted, and of which some undoubted facts have been brought before the Committee. They relate chiefly to enteric and scarlet fevers, measles, and whooping-cough.

In all these diseases there occurs, either as a usual or frequent accompaniment, some affection of the throat; in scarlet fever the specific sore throat, in measles and whooping-cough catarrhal inflammation and irritation by cough, in enteric fever, more rarely, tonsillitis and ulcer or abscess of the larynx. The precise relation of the faucial and laryngeal exudation in these cases is a question admitting of much variety of opinion; it may be questioned whether the presence of these throat conditions favours the attack of an unsuspected source of contagion of diphtheria, or whether it is to be regarded as evidence of the origination of true or spurious diphtheria *de novo*. (Other evidence upon this question will be found in the Reports of Dr. Sanderson and Sir W. (then Dr.) Gull to the Medical Officer of the Privy Council, 1858. The association and sequence of scarlet fever and diphtheria are there especially noted. Dr. Gull observed that diphtheria attacks adults especially when they were suffering from some other disease.)

The Committee think it sufficient to call attention to the facts, and to suggest further inquiry with reference to the points—whether these cases are contagious to persons in health, and whether they present, as a rule, the other symptoms of diphtheria, and are followed by its sequelæ; as also whether their occurrence coincides in time with the presence of diphtheria in an epidemic or sporadic form.

It may be pointed out that some of the earliest observations upon the occurrence of diphtheria after measles were made in 1843, by Dr. West, the President of this society.

It had been previously described by Ryland ('Diseases of the Larynx,' 1837, p. 166), who observed it in a number of cases after measles, and in one case after smallpox. Other facts bearing on this subject may be found in the 'Report to the Medical Officer of the Privy Council,' 1858, p. 326.

In several of the cases given in detail in the tables, the membranous exudation involved the fauces as well as the larynx. Dr. Dickinson's table gives two cases accompanying scarlet fever. In many cases of membranous exudation following fevers which have been recorded, and in some of those placed at the disposal of the Committee by Dr. Murchison, the exudation was in the fauces only.

Laryngeal symptoms with no false membrane found :

After measles . .	Dr. Dickinson, 2	Dr. Fagge, 1.
„ scarlet fever .	Dr. Fagge, 1.	

False membrane in larynx only :

Measles . .	Dr. Gee, 1.	
Scarlet fever .	Dr. Gee, 2 (and Sc. F. in house, 2).	Dr. Fagge, 1.
Whooping-cough .	Dr. Gee, 1.	

False membrane in fauces and larynx :

Measles . .	Dr. Dickinson, 2.		
Scarlet fever .	Dr. Dickinson, 2.	Dr. Fagge, 1.	M. & Sc. F., 1.
Typhoid . .	Dr. Gee, 1.	Dr. Murchison.	

Membranes in fauces only :

Typhoid . .	Dr. Murchison, 2.	Dr. Macpherson, 1.

There is, however, one point which bears upon the origination of diphtheria *de novo*, and indirectly upon the subject of membranous laryngitis, viz. the occurrence of membranous exudation as a terminal complication of exhausting and septic diseases.

This point has been especially noted by Dr. Wilks in his reply, and he has elsewhere referred to it in more detail.

Origin of membranous laryngitis from a definite exposure to cold.

Notwithstanding urgent and repeated public appeals, no single case of membranous exudation in the larynx resulting from exposure to cold has been furnished to the Committee (though several in which exudation in the pharynx or on the tonsils has been supposed to have resulted from cold have been sent in). The only cases to which reference is made are those collected by the Committee, especially by Dr. Fagge and Dr. Gee. Dr. Fagge has recorded three cases (Cases 58, 59, and 60, loc. cit.) in which this was with some probability ascribed as a cause. Dr. Gee mentions two cases in which cold was stated to be the cause. It is worthy of remark that three cases in which there was also membrane in the fauces were similarly ascribed to cold.

It would appear then that mere exposure to cold and wet is remarkably infrequent as the alleged cause of membranous laryngitis.

Nor have the replies in any of the other points on which inquiry was made contributed anything to our knowledge of the etiology of membranous laryngitis.

3. *Course and symptoms in individual cases.*

The third part of the inquiry relates to the symptoms in individual cases and in classes of cases, and as to how far they afford any clue to a distinction of membranous laryngitis into different forms.

Very great difficulty has been felt in dealing with the subject on account of the want of any marked symptom or criterion by which provisionally to separate the cases for inquiry. The only one which promised any success is that which has been adopted, viz. the anatomical localization of the false membrane. In a large proportion of cases of diphtheria it is assumed as probable that at some time in the

course of the case there will be some false membrane on some part of the fauces or pharynx, and provisionally this may, in the absence of better distinctions, be accepted. But in practice, there are the greatest difficulties in the application even of this test. In the best marked cases of epidemic diphtheria in infancy the membrane is often in such a position that it is discovered with difficulty during life. In children under five years of age the thorough examination of these parts is almost impossible, large quantities of membrane existing unsuspected in some cases.

Or the membrane in the pharynx may be only a thin pellicular exudation readily detached, and, occurring at the outset only, may be undiscovered during life, and may have altogether disappeared at the time of death, laryngeal exudation then alone existing. This fact diminishes the value of all cases in which a post-mortem examination is not made, and that at a comparatively early period. It will at once be evident that such cases cannot be expected to present either the symptoms or the morbid appearances which are seen in a case where the disease lasts several days, and is attended throughout with grave constitutional disturbance. It is, moreover, allowed that there are *some* cases of true diphtheria in which the air passages are alone affected, and it is clear that whilst they are the only cases which afford a complete type of comparison, it is extremely difficult to select them. It is probable that the presence even of slight affection in the fauces may modify the local and general symptoms, hence the purely laryngeal cases of true diphtheria cannot be expected to present all the symptoms usually attributed to that disease.

The constitutional symptoms must also be greatly modified by any condition which causes rapid asphyxia.

And if we take as the standard of comparison for diphtheria, cases which, while mainly laryngeal, present a small quantity of exudation in the fauces, we are also assuming that all membranous exudation in the fauces, however slight, is due to diphtheria.

It would therefore appear that the only cases which we

Sporadic need not mean without
contagion
of solidarity - but a case
occurs alone against
a background

Bacterial hyperia - secondary

arise from long dormant virus of previous

? can this be inhibited 1 a vaccine 2 inhibit 3 - Direct implant 4 inoculate

Inoculation possible by blood or pulse marrow not cerebrum

Effect short incubation 2 wk lag
week. before the symptoms begin

Stirring of Hill keeping secondary phase a month

The Carbolic acid against the local origin of Diphtheria
does not imply that the poison is absorbed into the
stand
blood ! that it is

Dr Chapman succeeds in checking
Ulcer in Brooklyn N.Y.
by

abnormal activity of white corpuscles
as by any local effect — the wounded membrane.

ST. GEORGE, HANOVER SQUARE,

PROVIDENT DISPENSARY.

February 6th, 1879.

The favour of your attendance is requested at the ANNUAL GENERAL MEETING of the Governors and Subscribers, to be held at the DISPENSARY, 59, Mount St., on Tuesday, the 11th day of February, at half-past Four o'clock, on the usual business.

T. ST. L. ALCOCK (Colonel), *Hon. Sec.*

G. H. LEAH, JUN., *Secretary.*

Diphtheria said to be first a
local disease -
a Dr J. O. Whitney of Pawtucket says
a the constitutional effect depend upon
the absorption of the decomposed membrane
just the same alone - proof of the
specific [illegible] but the same
[illegible] when this forms is diphtheria
& get no general disease unless by re
infection first - is restricted the
patient
often say local first & the my increase
of bacteria locally spread & become general
but here it must decompose
& must decomposed or tested,
& must be contagious
one virus might be tested in any disease with a
membrane spreading such membrane
might decompose & or set up contagious
- nothing else but contagious
because it has had decomposed

can take as a true standard for comparison are those in which the diphtheritic nature is proved by their contagious origin or results, and such cases are necessarily few.

The great fatality which attends membranous laryngitis, as such, renders any inference from the sequelæ of comparatively small value. This is especially the case with regard to the paralysis of the soft palate which is characteristic of diphtheria. It is indeed very doubtful whether this ever occurs even in cases of true diphtheria where the exudation is limited to the air passages; moreover, it occurs in only a small proportion of cases of well-marked faucial diphtheria. These two facts taken together—viz. the very high mortality and the comparative infrequency of paralysis—appear to minimise the value of any conclusions derived from the consideration of this sequela. But it is enough to state that no case of paralysis following membranous laryngitis has been reported to the Committee, or come under their notice.

The mortality in the cases of laryngeal membranous exudation, to which reference has just been made, was in the cases collected

	With faucial.		Without faucial.	
Dr. Dickinson's .	17 of 23	72 p. c.	7 of 9	77·7 p. c.
Dr. Fagge's . .	23 of 25	92 p. c.	18 of 18	100 p. c.
Dr. Gee's . .	41 of 42	98 p. c.	19 of 21	90·5 p. c.
Total mortality .	81 of 90	90 p. c.	44 of 48	91·6 p. c.

Even in some of the cases of recovery the presence of membrane actually in the larynx and trachea was doubtful. The mortality where laryngeal membrane is found, whether with or without faucial, is 90 per cent.

Mode of onset.

Do the symptoms which attend the onset, the duration of these before the occurrence of croupal symptoms, and the rapidity with which they reach a maximum, afford any ground of distinction?

Suddenness of onset is apparently a characteristic rather of the non-membranous form of laryngitis than of any special class of membranous. It was observed in a certain number, but only in a small proportion of the cases of laryngeal with or without faucial exudation. In Dr. Gee's cases of membranous laryngitis the laryngeal symptoms were observed to set in on the first day in 15 out of 21 of the purely laryngeal cases, and in 16 out of 42 of the laryngeal and faucial, in the remainder of the cases the onset being delayed to the second, third, and so on, to so late as the ninth day.

Fever, malaise, asthenia, or sore throat, were noticed before the laryngeal symptoms in nearly one half of Dr. Dickinson's faucial and laryngeal cases, and about one third of Dr. Gee's. They were present in 23 out of 42 cases of faucial and laryngeal, and in 17 of 21 of purely laryngeal collected by Dr. Gee.

There would thus appear to be a much greater difference between the mode of onset of non-membranous and membranous laryngitis than between any classes of cases of membranous laryngitis. In a very large proportion of cases in which the onset was abrupt, coming on in the course of the night, and the symptoms rapidly reaching their acme, the case, though urgent, did well, and all the evidence led to the belief that there was no false membrane in the larynx.

In Dr. Dickinson's cases abrupt onset in the course of the night was not observed in any single case of pure membranous laryngitis, but occurred in 7 out of 18 cases of non-membranous, and in 3 out of 12 cases of laryngeal with slight faucial exudation.

Symptoms.

Albuminuria.—The presence of albumen in the urine was thus distributed in the cases in which it was observed (these only being mentioned [1]).

[1] The number of cases in which it was recorded is small, owing to the difficulty in collecting the urine.

	Faucial.	Faucial and laryngeal.	Laryngea only.	No. f. m. observed.
Dr. Dickinson .	8 of 15	10 of 13[1]	2 of 3[2]	
Dr. Gee . .	—	22 of 25	7 of 13	0 of 11
Dr. Fagge . .	5 of 8	8 of 9	0 of 3	1 of 3
	11 of 18 (61 p.c)	40 of 47 (85 p.c.)	9 of 19 (47·4 p.c.)	

It appears from the cases collected by the Committee that although albuminuria occurs in both classes of cases, it is relatively much more frequently absent in those of laryngeal exudation only, that it is in much larger quantity where there is marked affection of the fauces, and often precedes laryngeal implication.

In a considerable number of cases of laryngeal form there was no albumen in the urine, in some there was only a trace, and in others it only occurred where there was great obstruction to respiration. If we subtract from these cases all those in which a diphtheritic origin was proved, the proportion of cases of albuminuria would be still smaller. As it is, the ratio is 47·4 per cent. in the laryngeal, 85 per cent. of laryngeal and faucial.

It is evident that while this raises a presumption in favour of the distinction of a non-diphtheritic form of membranous laryngitis it cannot be considered at all decisive, owing to the early fatality and the possibility that the laryngeal affection may modify its presence; and in any given case it will be seen that the criterion of albuminuria would be indecisive.

Moreover it is shown by certain cases, that albumen occurs in the urine in cases of laryngitis, in which no membrane is observed, in one of Dr. Fagge's (Case 85) where no other cause than the dyspnœa could be found.

As to the other general or constitutional symptoms to which some importance has been attached, the Committee have not sufficient facts upon which to base any conclusion.

[1] 4 of 4 where much faucial matter in throat and albumen in large quantity.
6 of 9 „ little „ „ „ in 4 in small quantity; one only after tracheotomy.

[2] One of these was proved diphtheritic (M. Hutson).

Local conditions of the throat.

Swelling of the glands of the neck.—This, so far as the facts at our disposal go, has been far more frequent and well marked where the fauces have been affected, than where only the larynx, and has borne some proportion to the extent and duration of the affection. But in certain of the cases of faucial diphtheria it has been distinctly stated that the glands were not swollen. The glands swollen would probably be different in cases of affection of the larynx, from those where the pharynx was the seat of disease.

(In many cases tracheotomy was performed, and this of course introduces a new element of irritation, and diminishes the value of any conclusion derived from post-mortem examination, the glandular swelling being possibly due to the operation.)

Locality of the false membrane.

The limitation of false membrane to the larynx and trachea is not, as has been pointed out, easily to be determined during life. It is only in those cases examined after death that a certain conclusion can be reached, and even in these there may have been some slight faucial exudation, though none persists after death.

In a very large proportion of the cases in which laryngeal exudation was fatal, more or less false membrane was observed in some part of the fauces before or after death. Great differences are found to exist in the amount of implication of the air passages in different cases.

Relations of Membranous and Non-membranous Laryngitis.

The large numerical proportion which the cases where membrane in the air passages and fauces, or even in the air passages alone, is to be attributed to some kind of zymotic

influence, bear to those in which it can with any probability be ascribed to cold, together with the uncertainty which forbids us in any case to regard the causation by cold as more than a probability, makes it important to inquire whether there be any mode of distinction between the membranous inflammation and the non-membranous or catarrhal laryngitis, the frequent production of which by exposure to weather does not admit of dispute. The inquiry presents a difficulty in our necessarily less perfect knowledge of the pathological conditions which are followed by recovery than of those which lead to death. In the fatal cases of croup, membrane, as proved by post-mortem examination, is almost always to be found. Among the cases which end in recovery there is rarely any evidence of membrane; but of these our knowledge cannot be such as to enable us to say with certainty that at no time nor to any extent was membrane there. Could it be generally inferred that in a case in the course of which no membrane had ever been seen none had existed, the facts would at once indicate a broad and simple division between membranous croup almost always fatal and non-membranous croup almost always not so.

The facts before the Committee are striking, however they are to be interpreted. Dr. Fagge examined the records of Guy's Hospital without meeting with a single case of croup (using the term in the clinical sense) of which the subject was examined after death without the finding of membrane.[1] One exceptional case afterwards occurred and is mentioned in a foot-note to his tabulation. Dr. Dickinson relates 23 instances of post-mortem examination in cases of inflammatory laryngeal obstruction: membrane was found in 22, the solitary exception being one of œdema of the glottis. And Dr. Gee's search into the records of experience of the other physicians of the Hospital for Sick Children found 60 fatal cases of membranous laryngitis, but not one fatal case of the non-membranous variety.

[1] One such case, which occurred in 1869, has been discovered in the records. The patient was a male child three months old.

Thus, non-membranous croup, whatever be its frequency, is very rarely fatal; it is to be met with, if at all, only, or almost only, among records of recovery.

Cases of croup of which the symptoms closely resemble those of the membranous kind, but in which no membrane is found, and which end in recovery, are numerous; it has to be determined with regard to such whether membrane did not exist or only did not appear. Is there a large class of cases of membranous croup in which no membrane is coughed up or seen *in sitû* and which end favorably, or are the majority of such cases of the non-membranous kind?

The facts before the Committee show that even where false membrane was found in the larynx and trachea after death, it was seen during life in but a small minority of the cases in which it was limited to the air passages, and if we exclude the cases in which tracheotomy was performed, the number becomes still smaller. Thus, of Dr. Dickinson's nine cases in which the membrane was thus limited, in only one was its existence shown during life apart from tracheotomy. In any given case, therefore, the fact that no membrane was observed would not negative its existence. And it might be suggested that only in those cases in which the inflammatory process is of sufficient intensity to give rise to false membrane does a fatal result ensue.

It must be allowed that this source of fallacy cannot be entirely excluded, but there are other considerations derived from the study of these groups of cases which indicate essential distinctions between membranous and non-membranous laryngitis.

If we put together all the cases in which false membrane was observed during life or after death, either associated with, or apart from, faucial exudation, we find that those in which it is limited to the larynx and trachea form about one third of the whole. The proportion in Dr. Dickinson's 32 cases was 9 to 23, in Dr. Fagge's 52 cases 18 to 34, in Dr. Gee's 63 cases 21 to 42, so that of a total of 147 cases 48 were affected in the respiratory tract alone.

The enormous fatality of membranous affection of the

larynx of whatever degree is shown by the fact that of those cases in which the membranous nature of the laryngeal affection was rendered probable during life by the discovery of membrane on the tonsils or in the pharynx, recovery took place in only 9 cases of 90, or 10 per cent.

Apart, however, from this head of evidence, and from the consideration of the results of post-mortem examination in cases clinically croupal in character (to which the objection may be raised that the great rarity of the absence of membrane post mortem is due to the fact that the inflammation in the non-fatal cases is not sufficiently intense for its production), we find that in the consideration of this presumedly non-membranous class there are some striking distinctions. The differences thus observed are of such a nature as to render it probable that this group of cases is essentially distinct.

If we take these groups, membranous and presumedly non-membranous, we find marked distinctions as regards sex, mode of onset, duration, tendency to recurrence and albuminuria.

The distribution between the sexes of non-membranous and membranous croup has its bearing upon this question.

Sex.—The membranous affection of the larynx, like faucial diphtheria, appears to be distributed without sexual preponderance. Dr. Gee's tables, derived from the hospital case-books of Drs. West, Hillier, and Buchanan, show that laryngeal membrane, either thus limited or together with a similar state of the fauces, was found in 28 male subjects, 34 females. Adding to these the cases from Dr. Dickinson's practice, mostly derived also from the Hospital for Sick Children, 15 males, and 17 females, we have a total of 43 males to 51 females thus affected. These numbers at least prove that in the practice of the physicians of the Hospital for Sick Children boys do not suffer from membranous affection of the larynx more frequently than girls.

If there be a class of cases, therefore, in which the sexes are represented in very different proportion the presumption

is that the disorder is of a different kind. Adding together the cases derived as specified from the practice of Drs. West, Hillier, Buchanan, and Dickinson, the tables present 30 males and 12 females as the subjects of croup without evidence of membrane.

Of Dr. Dickinson's 18 cases in which no membrane was seen, 4 are to be reckoned upon less surely than the others, as they were incomplete in consequence of the premature removal of the patient; one in particular, Daniel O'Connell, was taken out in a state of much dyspnœa, having been under treatment for nine days, and might with much likelihood have displayed membrane one way or another had opportunity been afforded.

Putting aside the cases of which the issue is uncertain, there were of 14 cases without visible membrane, 13 recoveries and 1 death, no tracheotomy.

Dr. Gee's collection of cases from the books of the Hospital for Sick Children shows a similar result. Of 13 cases of acute laryngeal inflammation, 'croup' in common phrase, in which no membrane was found, all recovered.

In 63 cases comprised in the same tables in which the larynx was involved and the presence of membrane ascertained there were 3 recoveries to 60 deaths. Tracheotomy was performed in 34 instances. In this comparison an allowance must be made for the more complete knowledge gained of the fatal cases by post-mortem examination than was possible in the others. Thus cases may have been classed as membranous only because they were fatal; since membrane may be evident after death which was not so during life. But even with this drawback the facts are significant.

It will be noted that in the comparison drawn from Dr. Dickinson's abstract this source of error has been avoided by the separation of post-mortem evidence. Dr. Dickinson's tables show that even where the membrane was confined to the larynx it came into view in 3 cases out of 8, while the membrane where less limited and necessarily more often seen, came into view in 19 of 24 cases; in the total of 32 cases in

which membrane was ascertained to exist in the air passages membrane or tonsillar deposit was seen in 22.

	Membrane observed during life or after death in	Membrane seen during life in	Membrane seen only after death in	Membrane seen as such in throat	Only white spots or patches on tonsils in	Membrane coughed up, in	Membrane expelled by tracheotomy hole.
2. Membranes confined to air passages; 8 cases .	8	3	5	0	1?	1	2
3. Membranes in air passages, with slight affection of throat; 13 cases . .	13	9	4	4	4	1	4
4. Membranes extensively in throat as well as in air passages; 11 cases . .	11	10	1	10	0	2	2
	32	22	10	14	4	4	8

Of the 22 cases in which membrane was seen during life, 8 ended in recovery, 14 in death. Of the recoveries 6 were after tracheotomy; of the deaths 11 were after tracheotomy, giving a total of 17 out of the 22 in which this operation was resorted to.

Dr. Fagge's collection of cases affords a contrast of the same kind notwithstanding that his results are in one respect very different.

Of 12 cases of croup related by Dr. Fagge in which no membrane was seen the issue was known in 11. Of these recovery took place in 9; death in 2. Tracheotomy was performed in no less than 7 instances, comprising the 2 fatal and 5 of the fortunate cases. In the 2 fatal cases no post-mortem examination was performed, so that their nature may be doubtful. Were they put aside we should have 9 recoveries in as many cases, comprising 5 of tracheotomy; a result unexampled in the history of cases in which membrane has been recognised.

Albuminuria.—In regard to the question of albuminuria in non-membranous croup, the urine in 3 of Dr. Fagge's cases was examined, in one found to be albuminous. Among Dr. Dickinson's were 4 cases in which it was examined; one in which it was albuminous, this exceptional instance being that of the equivocal Daniel O'Connell. In 13 cases of non-membranous laryngitis collected by Dr. Gee the urine was examined in 11 cases, and in all it was free from albumen; in two cases it was not examined. This result is a very striking one. A larger appeal to facts is needed; should the general exemption of non-membranous croup from albuminuria be ascertained, the fact would be both of pathological interest and practical importance.

Mode of onset, &c.—The question as to whether non-membranous croup is more sudden or rapid in onset than the membranous kind is one of much practical interest. Of 19 cases of presumably non-membranous croup, under Dr. Dickinson, 8 began with a sudden seizure in the night, the patient having gone to bed well or only affected with a slight catarrh. Of 21 cases from the same source, in which membrane was known to have existed and was mainly laryngeal (Tables 2 and 3 of Dr. Dickinson's cases), this mode of beginning presented itself in three instances only, showing that though sudden nocturnal seizure is not peculiar to non-membranous croup, it is most frequent with it. Another point of difference is the duration of the illness. Reckoning from the first laryngeal symptom to recovery or death, and taking first the presumedly non-membranous class and the cases of recovery, the term of illness varied from 1 day to 44; giving for 14 cases an average of 19 days. Taking for comparison classes 2 and 3 in which the larynx was affected and the pharynx but slightly or not at all, the length of the illness ranged in 5 fortunate cases from 9 days to 35, giving an average of 28 days, showing that the membranous disorder lasts on an average longer, while it is less variable in its duration than the class with which it is contrasted. Looking at the fatal cases, the quick fatality of the membranous class is characteristic; 16 cases of this kind ended fatally at periods

varying from 1 day to 18 days from the first laryngeal symptom, giving an average duration of 4 days. (For further particulars see Dr. Dickinson's tables). The non-membranous class is so seldom fatal that on this point no comparison can be made. A distinction is further to be made in the liability of non-membranous croup to recurrence, while we have no evidence of such a tendency in any form of disease attended with the formation of membrane. Dr. Dickinson's tabulations show that in three subjects of the presumably non-membranous disease attacks were repeated, while with the membranous class there was no instance of the kind save one, in which a child was said to have had "a dozen attacks" which were obviously of a different nature from the contagious diphtheria which at last brought her under notice.

A point of practice frequently noted with regard to the non-membranous class is the occasional urgency of the dyspnœa, suggesting an immediate resort to tracheotomy; and its subsidence, though the operation be withheld, under the influence of time and appropriate treatment. When membrane has been seen there is little to encourage the tactics of delay. Of the 19 cases of membranous laryngitis already referred to as having displayed membrane during life, but 2 recovered without the operation.

Definition of the word Croup.

We are told that the word croup, like the word rickets, was in use among the common people, to designate a special kind of disease, long before nosologists borrowed the term. This being so, we know that the name must have been given to appearances of disease seen in the living person, not in the dead body. In other words, croup is a semeiotic term, relating to lesion of function; and, provided we keep within this principle, we may try to improve the current definitions of the word. But if we wish to designate a notion of a kind altogether different, we should not depart from this principle

by wholly perverting the meaning of a word which has long been used in one sense, so as to employ it in another sense; but we should follow the example of Bretonneau, and invent a new term to express the new notion. According to Baglivi's opinion, "That the Moderns should not be opposed to the Ancients, but united with them by a perpetual League, as much as may be; for what can be more indiscreet, than to make them disagree in Words, when they agree upon the Matter?"

To repeat: the word croup relates to lesion of function. The notion, which the term signifies, is not a simple notion, but a complex notion, put together in some such manner as the following:

I. In the first place comes the *Angina laryngea*, the lesion of the laryngeal functions, to wit, the breathing and the voice. The breathing is changed from easy to difficult, and from silent to noisy; the voice becomes hoarse (the exact characters of croupy sounds cannot be conveyed by description, they must be heard to be known); but inasmuch as almost all laryngeal diseases manifest these altered functions, we must distinguish further; and,

II. In the second place, define croup to be an acute disease, sudden in its onset, and swift in its course; but laryngeal disease may be acute and yet not be croup; wherefore we must distinguish further; and,

III. In the third place, add fever to the definition; but acute febrile laryngeal disease is not always croup; and, to complete our definition, we must make more distinctions, namely:

IV. In the fourth place, croup is a primary laryngeal disease; that is to say, it is not secondary to disease in the neighbourhood of the larynx. We do not mean to say that the fauces are wholly free from disease, but that any appearances of inflammation or exudation are slight, and thrown into the shade by the laryngeal lesion.

V. In the fifth place, croup is a disease of childhood. The purpose of this clause in the definition is to debar from the name of croup the acute œdematous laryngitis of adults.

We do not say that adults may not suffer from croup, but that the very uncommon cases of that kind do not admit of absolute diagnosis, excepting by the use of the laryngoscope. In the croup of children the laryngoscope can seldom or never be employed, wherefore we say that croup is a disease of childhood, the other form of acute febrile primary angina laryngea being a disease of adult life.

VI. In the sixth and last place, we will add that croup is spontaneous; that is to say, not due to chemical or mechanical injury of the larynx.

It will be seen at once that, in part, we have argued out Cullen's definition of cynanche trachealis:

i. Respiratione difficili, inspiratione strepente, voce raucâ, tussi clangosâ (*i. e.* the angina laryngea).

ii. Tumore fere nullo in faucibus apparente, deglutitione parum difficili (*i. e.* primary disease of the larynx).

iii. Et febre synochâ (*i. e.* the fever). To these clauses we have added three more, in order to make the definition still more precise, namely, croup is an acute disease of childhood, not traumatic. So that our definition runs thus:—Croup is an acute febrile primary spontaneous angina laryngea, occurring for the most part in children.

Divers kinds of Croup.

More than a hundred years ago men began to distinguish two kinds of croup; the one ending almost always in health, the other in death. Hence the names of spasmodic croup as distinguished from inflammatory croup, of false croup from true croup, of stridulous laryngitis from diphtheritic laryngitis, and so on. Whether these two kinds of croup differ in essence or only in degree, whether they correspond with the anatomical species of catarrhal and membranous laryngitis, are points still unsettled. However, this is certain, that we cannot pretend to lay down the grounds of an absolute diagnosis, for the signs are the same in both kinds of disease. But the croup which ends in health may be sometimes

distinguished by a more sudden onset, a more speedy attainment of a high degree of dyspnœa, and less dysphonia.

Definition of the word Diphtheria.

Bretonneau, who invented the word diphtheria, nowhere gives a formal definition of it. But, by going over his writings, we may pick out for ourselves the meaning he gave to the term, namely :—

Diphtheria is a specific inflammation of mucous membrane or of excoriated skin.

This definition involves two principles, distinct from each other, and distinct also from the principle which we adopted in defining the word croup. The definition of diphtheria is partly anatomical, partly ætiological. We will discuss these parts separately.

I. In the first place, diphtheria is a lesion of structure ; it has an anatomical characteristic, namely, inflammation of mucous membrane or of excoriated skin, tending to the formation of concrete exudation upon and within the inflamed tissue. For the words "concrete exudation," Bretonneau sometimes substitutes "false membrane" or "pellicular exudation." But inasmuch as there are many pellicular inflammations which are not diphtheritic, and which anatomy cannot distinguish, Bretonneau had to seek for further aid from ætiology, and,

II. In the second place, to define diphtheria as a specific disease. That is to say, diphtheria is believed to be the result of a peculiar virus acting upon the structures of the body. The virus precedes and underlies the anatomical change. Excepting this result of the virus, very little is known about it ; it is sometimes contagious and sometimes epidemic. Wherefore the diagnosis of a diphtheritic pellicular inflammation depends upon two kinds of data ; to wit :

1st. Positive, namely, the presence of an epidemic, that is to say, of the diphtheritic virus.

2nd. Negative, namely, by exclusion of other diseases

which are sometimes attended by pellicular inflammations of mucous membrane; for example:

i. Common membranous or fibrinous angina, as Bretonneau calls it; the "specked throat" of Withering, and the "pharyngeal herpes" of Trousseau; a diagnosis often difficult or even impossible.

ii. Scarlet fever.

iii. Dysentery.

iv. Oidium albicans.

v. Mercurial angina faucium (according to Bretonneau).

vi. Pellicular inflammation due to the corrosion of poisons.

Conclusions (Summary of).

1. Membranous inflammation confined to or chiefly affecting the larynx and trachea may arise from a variety of causes, as follows—

A. From the diphtheritic contagion.

B. By means of foul water or foul air, or other agents, such as are commonly concerned in the generation or transmission of zymotic disease (though whether as mere carriers of contagion cannot be determined).

C. As an accompaniment of measles, scarlatina, or typhoid, being associated with these diseases independently of any ascertainable exposure to the special diphtheritic infection.

D. It is stated on apparently conclusive evidence, although the Committee have not had an opportunity in any instance of examining the membrane in question, that membranous inflammation of the larynx and trachea may be produced by various accidental causes of irritation, the inhalation of hot water or steam, the contact of acids, the presence of a foreign body in the larynx, and a cut throat.*

* One such case has been communicated since this Report was completed, and will be described in a note to the Appendix upon the Morbid Anatomy and Histology, p. 95.

2. There is evidence in cases which have fallen under the observation of members of the Committee and are mentioned in the tables appended, that membranous affection of the larynx and trachea has shortly followed exposure to cold, but their knowledge of the individual cases is not sufficient to exclude the possible intervention or coexistence of other causes. The majority of cases of croupal symptoms definitely traceable to cold appear to be of the nature of laryngeal catarrh.

3. Membranous inflammation, chiefly of the larynx and trachea, to which the term "membranous croup" would commonly be applied, may be imparted by an influence, epidemic or of other sort, which in other persons has produced pharyngeal diphtheria.

4. And conversely, a person suffering with the membranous affection chiefly of the air passages, such as would commonly be termed membranous croup, may communicate to another a membranous condition limited to the pharynx and tonsils, which will be commonly regarded as diphtheritic.

It is thus seen that the membranous affection of the larynx may arise in connection with common inflammation or with specific disorders of several kinds, the most common of which in this relation is that which produces similar change elsewhere, and is recognised as diphtheria.

In the larger number of cases of membranous affection of the larynx the cause is obscure (*i. e.* in any given case it is difficult to predicate the particular cause in that case).

Among those in which it is apparent, common irritation seldom presents itself as the source of the disease, accidental injury is but very infrequently productive of it. But few cases of undoubted origin from exposure to cold are on record. On the other hand, in a very large number of cases infective or zymotic influence is to be traced.

The membrane, even when chiefly laryngeal, is more often than not associated with some extent of a similar change in the pharynx or on the tonsils; and whether we have regard to the construction of the membrane, or to the constitutional state, as evinced by the presence of albumen in the

urine, it is not practicable to show an absolute line of demarcation (save what depends upon the position of the membrane) between the pharyngeal and laryngeal forms of the disease.

The facts before the Committee only warrant them in the view that when it obviously occurs from a zymotic cause or distinct infection and primarily affects the pharynx, constitutional depression is more marked, and albuminuria more often and more largely present, though in both conditions some albumen in the urine is more frequently present than absent.

The most marked division indicated by the facts before the Committee is that between membranous and non-membranous laryngitis.

The Committee suggest that the term *croup* be henceforth used wholly as a clinical definition implying laryngeal obstruction occurring with febrile symptoms in children. Thus croup may be membranous or not membranous, due to diphtheria or not so.

The term *diphtheria* is the anatomical definition of a zymotic disease which may or may not be attended with croup.

The Committee propose that the term membranous laryngitis should be employed in order to the avoidance of confusion whenever the knowledge of the case is such as to allow of its application.

W. Howship Dickinson, *Chairman.*
C. Hilton Fagge.
Samuel Gee.
J. F. Payne.
H. G. Howse.
R. H. Semple.
W. S. Greenfield, *Secretary.*

The members still serving on the Committee think it right to state that the plan of operations was designed, and much of the earlier work executed, under the auspices of Dr. West as chairman, whose retirement, in consequence of his succeeding to the office of President of the Society, the Committee

have to regret. Since then the chairman has been Dr. Dickinson, and to him also the Committee desire to express their warm thanks.

In the next place the members of the Committee desire to express their sense of the services performed by Dr. Greenfield as secretary, by whom the laborious task of collating the evidence which has been brought together has been mainly performed. If these results should be thought to have any value we are conscious that it must be largely attributed to his unremitting and conscientious work.

Copy of First Circular of Inquiries.

No.

ROYAL MEDICAL AND CHIRURGIAL SOCIETY,
53, BERNERS STREET, OXFORD STREET, W.

SIR,

The Sub-Committee appointed by the Royal Medical and Chirurgical Society to inquire into the relations of "Membranous Croup and Diphtheria" are anxious to obtain the result of the experience and observation of medical practitioners throughout the country on the subject.

They therefore venture to hope that you will, as far as may be in your power, reply to the annexed queries, which have been drawn up with the view of determining the identity or non-identity of these diseases; and that you will further refer the Committee to any practitioners in your neighbourhood who may have had such opportunities for observation as may render their experience on this question of special value.

For the purposes of this inquiry the following definitions are adopted:—

1. Diphtheria is a contagious specific disease, which is accompanied by the formation of false membrane in the pharynx, air-passages, and elsewhere.
2. Croup is a disease accompanied by the formation of false membranes (mainly in the larynx and trachea), the origin of which is in question. No case is to be spoken of as an example of croup in which false membranes were not observed either during life or after death.

We are, Sir, yours, &c.,

CHARLES WEST, M.D., *Chairman.*
W. S. GREENFIELD, M.D., *Acting Secretary of Committee.*

List of Queries.

1. Is your field of observation situated in an urban or a rural district, or partially in both?

2. What is the nature of the locality as to climate, soil, elevation, proximity to the sea, or to a river; or as to the drainage or overcrowding of any part of your district?

3. Have any of these conditions appeared to you to exercise an influence on the prevalence of either form of disease?

4. At what seasons of the year does either form chiefly prevail? Do they prevail simultaneously, either sporadically or epidemically; or may epidemics of the one be distinguished from epidemics of the other?

5. In connection with what other diseases do they prevail; either with influenza and bronchitis, on the one hand; or with angina tonsillaris, or other forms of sore throat, measles, and scarlatina, or other specific disease, on the other hand?

6. Have you observed cases of croup setting in with catarrhal symptoms, unattended by difficulty of deglutition, or by deposit of false membrane on the fauces, to be associated with albumen in the urine or followed by paralysis?

7. Have you seen in the same family at the same time, cases of croup in one member and of diphtheria in another; and have you any evidence to show that membranous croup is contagious, and capable by its contagion of producing diphtheria?

8. Taking the pathological fact of false membrane limited, or chiefly limited, to the larynx and trachea, what evidence can you adduce as to its origin, on the one hand, in the specific poison of diphtheria, and, on the other, in a definite exposure to cold, or any other cause of ordinary inflammation?

9. If you believe the two diseases to be identical in nature, on what reasons do you chiefly rely in forming your opinion?

10. If you have any hospital experience, or experience derived from a large school, will you be pleased to give the Society the benefit of it?

Copy of Second Circular.

ROYAL MEDICAL AND CHIRURGICAL SOCIETY,
53, BERNERS STREET; *May*, 1877.

DEAR SIR,

The Committee of the ROYAL MEDICAL AND CHIRURGICAL SOCIETY, engaged in the investigation of the relations of Diphtheria and Croup, are anxious to get some further facts which may enable them to decide whether there exists a non-diphtheritic croup, and by what means it may be distinguished from that due to diphtheritic contagion.

With this object they have drawn up the enclosed scheme for the analysis of records of cases in which the existence of false membrane in the larynx or trachea has been ascertained, during life or after death.

If you have any such records of cases, whether of "croup" or of diphtheritic laryngitis, and will be good enough to give the Committee an account of them, keeping especially in view the points indicated in the appended scheme (these having been selected as bearing on the division of such cases into two classes, and the means by which they may be distinguished), the Committee will be greatly indebted to you.

Should you be prevented by want of time from analyzing the records yourself, the Committee would still be glad of any notes which you may have, and such notes shall be carefully preserved and returned to you.

Yours very truly,
W. H. DICKINSON, M.D., *Chairman.*
W. S. GREENFIELD, M.D., *Secretary.*

I.—ETIOLOGY AND GENERAL HISTORY.

A. PREDISPOSING CAUSES.

- *α.* i. Season.
  - ii. Weather.
  - iii. Climate.
  - iv. Hygienic Conditions.
- *β.* Endemic.
- *γ.* i. Age.
  - ii. Sex.
  - iii. Hereditary predisposition.
  - iv. Constitution.
  - v. Previous health.

B. Association with other Diseases.
   (*a*) As epidemic. } Whether preceding, con-
   (*b*) In the individual. } current, or following.

C. Exciting Causes.
   i. Definite exposure to cold.
   ii. Previous attack of other disease.
   iii. Contagion. (Origination apart from definite contagion.)

D. Incubation Period.

E. Duration.

F. Protection from further attack.

G. Relapse.

II.—DISEASE—ATTACK OF.

1° Mode of Onset.

2° Genebal Condition.
   a. Asthenia (and "adynamic condition").
   β. Condition of Blood.
      (1) As seen with microscope.
      (2) Occurrence of ecchymoses, and hæmorrhages.
   γ. Temperature.
   δ. Nervous symptoms.
   ε. Albuminuria (and casts or blood in urine).
      (1) During attack.
      (2) After.

3° Local Conditions.
   a. Glandular enlargement, and general swelling in neck.
   β. False membrane.
      (1) Locality.
      (2) Spread.
      (3) Cicatrization as a result.

4° Course.

5° Period of Recovery.

6° Effects of Treatment.
   (Relative success of Tracheotomy in cases of supposed different forms—*i. e.* whether the presence of one or several constitutional symptoms hinders, on an average, recovery.)

APPENDIX I.

DIGEST OF REPLIES TO QUERIES.

The replies to the first series of questions issued have been collated and analysed with the following result.

It has been found difficult to arrange them in a complete form, or to introduce all the facts which come out in the statements. Some of the questions were put rather with a view of controlling the results obtained than of eliciting definite information, and where such is the case they are dealt with separately in the consideration of the replies to other questions.

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1. Is your field of observation situated in an urban or a rural district, or partially in both?

On analysing the replies to this question, it is found that by far the larger number of those who have answered are practising in towns, or in districts partly urban and partly rural, only five being in purely rural districts. The numbers are—urban, 27; urban and rural combined, 16; entirely rural, 5.

This is to be regretted, as there appears to be a tendency to consider that "croup" is more prevalent in rural districts, and in some of the replies it is distinctly stated by those who, at different times, have been engaged in town and country practice, that "croup" is more common in the country. Moreover, it is usually far easier to trace out the causes which give rise to the attack, and to exclude the possibility of contagion in the country than in towns, and climatic conditions are more definitely appreciable, and often exert a greater influence.

2. What is the nature of the locality as to climate, soil, elevation, proximity to the sea, or to a river; or as to the drainage or overcrowding of any part of your district.

To the first part of this question answers are given of the most various nature. The conditions stated to exist have been

carefully investigated, and so far as they seem to be of value, they have been further mentioned in considering other replies. An attempt was made to classify the several conditions of soil and climate, but the information was not of a sufficiently uniform character to be of service for this purpose. In many cases the conditions of soil and climate are very carefully described, but no facts are stated which in any way connect the diseases with local conditions.

3. Have any of these conditions appeared to you to exercise an influence on the prevalence of either form of disease?

As to the influence of soil, climate, drainage, &c., on the occurrence of croup and diphtheria, thirteen state that they have not observed that these conditions exercise any influence on either. These are—

Dr. Clement Dukes, of Rugby.
Dr. Long Fox, of Clifton.
Mr. French, of Maida Hill.
Mr. Leach, of Heywood.
Dr. Oscar Wyss, of Zurich.
Dr. Nicholls, of Chelmsford.
Dr. O'Neill, of Lincoln.
Dr. Julius Pollock, of London.
Mr. W. Smith, of Clifton.
Dr. Wilks, of London.
Dr. Willis, of Barnes.
Dr. Grimshaw, of Dublin.
Dr. T. Stevenson, of London.

As *favouring the occurrence of* croup the following conditions are mentioned:

Exposed river-side localities, by Dr. Hutton, of Belgrave Square. Variable climate and moist soil, by Dr. Harry Wells, of Gualeguaychu. On gravelly soil, Mr. Gaskoin. In rural districts, Dr. O'Connor, of March (diphtheria in urban); Dr. Price Jones, of Surbiton (diphtheria in suburban). In crowded neighbourhoods, Dr. Wm. Squire, of London.

As *favouring* diphtheria.

Proximity to sewage and deficient drainage are mentioned by—

Dr. Barratt, of Bayswater.
Dr. Langdon Down, London.
Dr. W. T. Greene, Old Kent Road.
Dr. Grigg, London.
Prof. Maclean, Netley.
Dr. Chas. Bell, Edinburgh.
Dr. Pye-Smith, London.
Dr. W. Squire, London.
Mr. Stretton, Kidderminster.
Dr. Duncan, Croydon.

Defective traps.

Dr. Bowles, Folkestone.
Dr. Lowndes, Egham (late Bombay).
Dr. R. Southey, London.
Dr. W. Squire, London.

Impure water supply.
Dr. GRIGG. Dr. HUMBY, St. John's Wood.
Mr. STRETTON, Kidderminster.

Decaying vegetable matter.
Dr. W. YEATS, of Bankfoot.

As *favouring both* CROUP *and* DIPHTHERIA.

Low level.—Dr. PAINTER, London.

Overcrowding and bad ventilation.—Dr. RANKE, Munich.

There is thus a large weight of opinion in support of the promotion of diphtheria by insanitary conditions.

4. At what seasons of the year does either form chiefly prevail? Do they prevail simultaneously, either sporadically or epidemically; or may epidemics of the one be distinguished from epidemics of the other?

As to the time of year, the statements need only be classified without the names of those who support them. The numbers appended will give the names, by reference to the table, of those who have replied.

As to diphtheria, the conclusion from these statistics would be that no time of year is especially favorable to its occurrence—it occurs in all alike. But one important fact must be pointed out, viz. that no distinction is drawn as regards the laryngeal form of diphtheria, and whether that form is especially apt to occur at certain seasons.

As to *croup*, the general opinion seems to be that it is especially common in cold and changeable weather.

As to the sporadic occurrence of croup the majority state their belief that it is sporadic and not epidemic.

I. SEASON.

DIPHTHERIA.—At all seasons, 4, 19, 79, 373, 436, 534, 567, 641, 643. Spring, 393. Spring and early winter, 366, 622. Early summer, 496. Late summer and autumn, 60, 339, 400. Autumn, 478. Early winter, 311, 614, 627.

CROUP.—Winter, 209, 226, 231, 400, 496, 624, 643. Winter and spring, 28, 60, 79, 162, 567. Spring and autumn, 205, 598. Early summer, 534. Autumn, 593. With east wind, 28, 534. In inclement weather, 291. Rapid changes of weather, 567.*

* Dr. Harry Wells, of Gualeguaychu, Peru, thus describes the conditions which lead to the occurrence of croup. "The town (Gualeguaychu) is surrounded by marsh land, and is situated in a hollow on the banks of a small river, Rio

II. *Croup sporadic*, 19, 43, 60, 79, 205, 284, 336, 567, 585, 618, 641. *Croup simultaneous with diphtheria*, 339, 602 (both in epidemics of diphtheria.)

III. *Epidemics distinguishable.*—"No," 435. "Yes." 534. *Neither strictly epidemic*, 643.

No croup seen, 167, 311 (for twenty years), 436, 585 (very rare).

5. In connection with what other diseases do they prevail; either with influenza and bronchitis, on the one hand; or with angina tonsillaris, or other forms of sore throat, measles, and scarlatina, or other specific disease, on the other hand?

With regard to the prevalence of either form of disease in connection with the occurrence of other disease, whether zymotic or due to the conditions of climate or weather, there is considerable difference of opinion.

On the one hand, as regards diphtheria, there is no doubt that this, like other zymotic diseases, is influenced in its outbreaks by general conditions of atmosphere and season, which produce a sort of epidemic influence; and although the exact conditions on which this depends are as yet unknown in their full extent, there can be no question that such conditions do exist, and determine the incidence or severity of nearly all epidemic diseases. The statistics of the Registrar-General, and inquiries by the direction of the Local Government Board, show this clearly enough. Thus measles and scarlet fever are known to tend to prevail together and under similar conditions of climate and season, and even apparently of individual constitution, an attack of the one disease often following that of the other. Nor does the question as to whether diphtheria is a purely zymotic disease, *i.e.* one originated almost entirely, and propagated solely by contagion, to any great degree interfere with this liability to be governed in its outbreaks and epidemics by these general conditions;

Gualeguaychu, a tributary of the River Uruguay. Climate temperate, but exceedingly variable, and subject to *rapid* transitions of temperature, 50° to 58° F. in winter, 80° to 88° F. in the shade during summer; latitude 33° south. Drainage none; overcrowding does not exist. There are sudden variations in the condition of atmosphere. The prevalence of a cold south wind and the combined influence of a moist soil and humid atmosphere, invariably produce croup in these regions. Croup is more especially prevalent during winter and spring; however, the rapid changes from heat to cold that continually occur during the summer months (that is to say, a sudden fall in temperature of 20° F.) occasionally causes croup. Diphtheria occurs all the year round. Nevertheless, according to my experience, croup and diphtheria have never occurred simultaneously, either sporadically or epidemically, and the differential diagnosis is easy."

seeing that for erysipelas and enteric fever, which may, in the belief of high authorities, be generated *de novo* by bad hygienic conditions, the same laws are found to hold good. This question of the relation of epidemics of diphtheria with those of scarlet fever and measles, for example, is too wide a one for the present inquiry, and does not immediately affect the problem before the Committee, it must be decided by an analysis of statistics drawn from a much longer period and supported by returns from a far wider area than are at their command. But, as regards individual cases, it is needful to consider one or two points which have been brought forward by some of those who have furnished their experience, before considering their replies in more detail. Firstly, as regards the occurrence of diphtheria in the course of other exhausting or septic disease. Dr. Wilks, in his reply, states that diphtheria may occur as a complication or sequel of typhoid fever, pyæmia, &c.; and Dr. Clement Dukes, of Rugby, makes a similar statement with regard to typhoid. Such cases as those described by Dr. Wilks in which a diphtheritic exudation is found after death in the fauces, pharynx, nares, œsophagus &c., of patients dying from malignant or long-continued exhausting diseases—though rare—are certainly well established. Often the condition is not discovered until post mortem.

The question arises with regard to the cases which may be indistinguishable from diphtheria in *all* their anatomical and clinical characters, how many are the result of contagion, by which they are more liable to be affected. Then arises also the inquiry whether these cases have the property of contagion, and reproduce true diphtheria in the healthy subject coming within the range of their influence. If we allow that such cases are in every respect identical with true diphtheria, we must have recourse to the hypothesis that the source of the patient's infection is "autogenetic" so to speak, that the abnormal conditions of the patient himself, or of secretions, &c., retained and decomposing in the cavities or organs of his body react on the individual in the same manner as similar conditions external to the body may react on a number of individuals. The materials afforded by the replies are insufficient for an analysis of this question.

The late Dr. Laycock in his reply says: "Diphtheria will complicate any epidemic, but more especially those affecting the alimentary canal and air passages. Croup appears to me to be due to constitutional peculiarities, and when these exist the peculiarity may be manifested in any form of disease of the air passages, and more especially in the epidemical as whooping cough, measles, &c."

Another point which it is important to notice, has been well pointed out by Dr. Ransom, of Nottingham, concerning the relation of tonsillitis to diphtheria and scarlet fever. It is

well recognised, both with regard to scarlet fever and diphtheria, that during an epidemic of either disease, cases are very common, in which a sore throat, very slight and perhaps almost unnoticed, and which is almost if not quite indistinguishable from ordinary tonsillitis, is the sole manifestation of the acute disease, yet that such attacks may be followed by the gravest sequelæ, scarlatinal dropsy on the one hand, and diphtheritic paralysis on the other; and, moreover, in the case of scarlet fever, confer protection from a subsequent seizure equally with the most severe attack, though perhaps not in so high a degree. In some cases, more especially in hospitals, or when a family is simultaneously affected with the disease, it is possible both in scarlet fever and in diphtheria to trace the course of such infection. This fact must be kept in view in considering the supposed relation of diphtheria with scarlet fever and with tonsillitis, and it is probable that some of the evidence on this point is invalidated by the fact that this has not been sufficiently clearly understood. But making due allowance for this there is strong evidence for the belief in the prevalence of diphtheria in association with scarlet fever. As regards tonsillitis the case is less clear, seeing that so large a number of mild cases of diphtheria, especially in the adult, completely simulate mild tonsillitis.

The replies under this head must therefore be accepted with some caution, inasmuch as this fact had evidently not been present to the minds of some of those who have made statements with regard to it.

Association of Diphtheria with *tonsillitis.*

Nine state that they have observed diphtheria prevalent with tonsillitis.

28. Dr. Barratt, of Bayswater: "Proclivity to tonsillitis at the time."

158. Dr. Langdon Down: "I noticed that when diphtheria was prevalent that there was more than usual a tendency to angina tonsillaris."

205. Dr. Long Fox, of Clifton, says: "In the only epidemic of diphtheria here in the last twenty years there was a great prevalence of angina tonsillaris without scarlatinal rash, and without false membrane."

231. Dr. Grigg (Brit. Hosp. for Ch.), has observed *both* croup and diphtheria.

393. Dr. O'Connor, of March, remarked that symptoms of tonsillitis usually occur at the commencement of the attack.

602. Dr. Yeats, of Bankfoot: "Angina tonsillaris was common during the epidemic, and in June, 1876, while diphtheria has been endemic, measles, whooping cough, and catarrhal sore throat have been very prevalent."

496. Dr. Reginald Southey.

622. Dr. Alois Monti: "With different forms of sore throat."

629. Mr. Stretton, of Kidderminster.

641. Mr. G. B. Irving: "Diphtheria sometimes associated with angina tonsillaris."

643. Dr. G. Tenderini.

19. Dr. Bakewell: "With various forms of sore throat, such as quinsy, inflammatory sore throat, ulcerated sore throat, in all localities observed."

With *Scarlet Fever.*

28. Dr. Barratt: "In epidemics."

43. Mr. Berry: "Prevalent with."

79. Sir G. Burrows: "As a sequela of measles and scarlatina in concurrence with those diseases."

400. Dr. O'Neill: "Coexisting with scarlet fever and measles in the individual."

435. Dr. Ranke.

598. Dr. C. Bell: "Diphtheria frequently oocurs along with scarlatina.

576. Dr. Wilks: "In private practice I have met with diphtheria in connection with scarlatina."

602. Dr. W. Yeats: "Scarlatina prevailed endemically during as well as previous, and subsequent to the diphtheritic and croupy epidemic. Scarlet fever was in some cases followed after an interval by diphtheria and croup, in some cases preceded by, and in some scarlet fever was complicated with diphtheria, in others by croup."

622. Dr. A. Monti: "Diphtheria has especially followed measles and scarlet fever in epidemics."

624. Dr. W. Squire: "Diphtheria is not an uncommon complication of scarlet fever if it be not an aggravated form of it."

643. Dr. Tenderini: "With acute exanthemata, roseola, measles, and scarlet fever."

Following *Scarlet Fever* in the individual.

226. Dr. W. T. Green.

336. Dr. Oscar Wyss.

393. Dr. O'Connor, Dr. Bakewell, Dr. Southern, Dr. Squire.

618. Dr. Stevenson doubts whether it is true.

With *Enteric Fever.*—Dr. Macpherson.

Association of Diphtheria with *Measles.*

79. Sir G. Burrows.

336. Dr. O. Wyss observed a great number of cases after an epidemic of measles.

393. Dr. O'Connor has observed a large percentage.
400. Dr. O'Neill.
435. Dr. Ranke.
534. Dr. Trend, following.
576. Dr. Wilks, *doubtful.*
585. Dr. R. Willis.
602. Dr. W. Yeats has observed it *with*, *before*, and *after*.
19. Dr. Bakewell: "With and after epidemics of measles and scarlet fever (as in Hanwell).
622. Dr. A. Monti: "Diphtheria has especially followed measles and scarlet fever."

There can be no question, therefore, that diphtheria tends to prevail in epidemics in connection with measles, and is also particularly liable to attack the same individuals especially after the attack of measles.

No relation observed.—158. Dr. L. Down.
534. Dr. Trend.
567. Dr. Harry Wells.
641. Mr. G. B. Irving.

Relation of Croup with other Diseases.

The diseases with which croup is observed to be associated, either coincidently as regards conditions tending to produce the two, or as occurring in a person suffering from another disease, may be classed as either produced by similar conditions, or rendering the individual liable to an attack. The number of those who have observed these relations is not large, but their evidence is important, and their testimony very unanimous. On the one hand it is agreed that true croup prevails especially under those conditions which favour the occurrence of catarrhal and inflammatory affections of the respiratory organs, and may occur together with them or successively in the same individual. On the other hand that those zymotic and infectious diseases which specially affect the air passages, as *e.g.* measles and whooping cough, are especially liable to be complicated with croup. Hence, any cause which in the adult would give rise to laryngeal catarrh, may in the child, especially if predisposed, give rise to croup. (It must be assumed that cases of purely *catarrhal* croup are excluded, but even those who recognise most clearly the distinctions between catarrhal and membranous croup allow that in a certain number of cases true membranous exudation occurs.

Influenza, catarrh, bronchitis, and pneumonia.

43. Bronchitis.
60. Catarrh.

79. Catarrh.
162. Bronchitis.
205. Bronchitis.
209. Bronchitis.
326. Any disease of air passages.
336. Croup *ordinarily* alone, in some with pneumonia and bronchitis; *false* croup with bronchitis.
393. Bronchitis, pneumonia.
400. Influenza, bronchitis, pneumonia.
496. Influenza, bronchitis.
534. Bronchitis.
622. Influenza, bronchitis.
624. Influenza, bronchitis, pneumonia.
567. Influenza, bronchitis.
643. Bronchitis.

Relations of CROUP *with*—

Measles.—162.
226. (This doubtful as in these cases false membrane subsequently in *fauces*).
339. Following measles.
534. In course of measles.
622. Occurring both in the eruptive and desquamative stage of measles. "Bei verschiedenen epidemien sah ich croup in eruptions-stadium oder in desquamations stadium der masern auftreten."
624. Dr. SQUIRE.
567. *Slight.*

Whooping cough.—326. Dr. LAYCOCK.
624. Dr. W. SQUIRE.

Scarlet fever.—567. *Slight.*
598. Dr. C. BELL says: "Croup very seldom with scarlet fever."

Tonsillitis.—624. 231.

Some of the answers to this question (5) are of sufficient value to be given in detail, especially as they introduce some new points as to the association of diphtheria with other diseases.

Dr. WILKS says: "In private practice I have met with diphtheria in connection with scarlatina, and, I think, with measles, and in puerperal women affecting pudenda as well as throat; in hospital practice in typhoid, pneumonia, pyæmia, phthisis, and, I think, other cases. I have seen isolated cases of diphtheritic affection of the throat occur in the hospital previous to the recognition of the disease as a novelty in 1855."

Dr. OSCAR WYSS says: "Diphtheritis laryngis is very often

complicated with diphtheritis pharyngis. Under my care have been in the Hospital for Sick Children (Vienna)—

	1874	1875	Total.
Diphtheritis pharyngis and laryngis, with tracheotomy	7	10	17
„ „ „ without „	1	4	5
„ tonsillarum	1	1	2
„ oris	1	0	1
„ conjunctivæ ocularis	2	0	2

The greater number of our diphtheritic patients were after scarlatina, or at the same time, but without scarlatinal symptoms; a number of patients had scarlatina some months ago, and after that time diphtheritis. In 1870 there was an epidemic of measles, with a great number of following diphtheritics. The same has been observed this summer, but only in a certain region of the environs of our town (in a poor population). The last year I have seen a certain number of rheumatismus articularis acutus complicated with diphtheria pharyngis."

6. Have you observed cases of croup setting in with catarrhal symptoms, unattended by difficulty of deglutition, or by deposit of false membrane on the fauces, to be associated with albumen in the urine or followed by paralysis?

a. Albumen in the Urine.

In reply to this query some state that they have not examined the urine, or have no records of such examination, 28, 43, 79, 226. The latter, however, says that in all his cases of "croup," or nearly all, there was false membrane on the fauces.

Dr. Reginald Southey (496) has no records on this point, but all his cases were rapidly fatal.

Dr. Wilks (576) states that he has observed cases which presented the clinical characters in question in which there was albumen in the urine, and they were followed by paralysis. These cases he regards as *diphtheritic*. He adds that the presence of albumen in the urine is unfavorable as regards prognosis, and that in the cases which have had no albumen in the urine, and no sequent paralysis, the proof of presence of false membrane in the larynx and trachea has been generally wanting.

Dr. W. Squire (624) observes that he has seen fugitive albuminuria occurring in children under the influence of trivial and temporary disturbances of health, such as a single night's fever with slight signs of gastric or pulmonary catarrh, and hence would not be surprised to find fugitive albuminuria in the course of an attack of croup, but if albuminuria persisted, he would consider it diphtheria.

Dr. Alois Monti (622) states that he has never found albumen in the urine in cases of sporadic croup such as described.

Dr. G. Tenderini (643) has not analysed the urine in cases of croup.

Definite observations as to the absence of albumen from the urine in membranous croup.

Dr. Bowles (60) says: "I have examined several cases of croup as described, and have never found albumen or paralysis, but all my cases have not been so carefully observed. When there has been much obstruction to the breathing, I should not be surprised to find albumen, and if it were present I should by no means consider it diagnostic of diphtheria."

Dr. O'Connor (393) says: "I have always paid special attention to the chemical condition of the urine in the two diseases under consideration, and I am strongly inclined to the opinion that in a case of croup occurring in a subject free from strumous taint albumen is not found in the urine."

Dr. Oscar Wyss (336) denies the existence of albuminuria and paralysis in such cases.

Dr. Grimshaw (614) gives two cases of membranous croup, one of which was fatal (and post mortem made), in which there was no albumen in the urine, and in the non-fatal case no paralysis followed.

Dr. Bakewell (19) states that he has not observed such cases with albumen in the urine (but that he has seen no case of true croup in the West Indies).

Dr. Harry Wells (567) states that "in those cases of croup in which the urine has been examined, the existence of albumen has not been verified, nor has paralysis ever followed an attack of croup in those that have survived."

Those who state that they have found albumen in the urine in true croup are—

Dr. Fitzpatrick (199) describes the case of a child, æt. 2½ years, with symptoms sudden in their onset, and resembling those of "acute inflammatory croup." Fauces not visibly affected. Albumen was found in the urine, and tracheotomy being performed false membrane was withdrawn from the wound. Dr. Fitzpatrick gives details which show that he considers the case diphtheritic as to its etiology. The sequel of the case is not given.

Dr. Long Fox (205) states that he has seen albumen in the urine temporarily once only in croup.

Dr. W. Yeats (602) states that he has seen it in several cases, that in many of these false membrane appeared subsequently on the fauces, but not in all. All his observations were, however, made during an epidemic of diphtheria, and therefore are not cases of non-diphtheritic croup.

b. Occurrence of Paralysis as a Sequel of Croup.

The great majority state that they have never seen true membranous croup followed by paralysis.

28. Dr. Barratt.
79. Sir Geo. Burrows.
284. Dr. Humby.
336. Dr. Oscar Wyss.
393. Dr. O'Connor (except in case of hereditary syphilis).
467. Dr. Sansom.
496. Dr. Southey.
567. Dr. H. Wells.
614. Dr. Grimshaw.
624. Dr. W. Squire.
641. Dr. Irving.
643. Dr. G. Tenderini.
622. Dr. Alois Monti.

The only statements of the existence of paralysis following croup are as follows:

Dr. Greene (226) says: "I have observed several cases of croup quite without difficulty of deglutition to the very last, which were ushered in with catarrhal symptoms. False membranes on the fauces have been so generally present that I cannot recal one instance to the contrary. One case was followed by temporary paralysis of the left side." (From which it is clear, firstly, that all the cases were probably diphtheritic, and that the only paralysis observed was a slight hemiplegia, probably due to thrombosis or embolism.)

Dr. Ranke, of Munich (436), says that he has observed croup followed "by paralysis of the larynx, so that for a time part of everything swallowed entered the windpipe and was coughed up again." (But from other parts of his replies it appears that he speaks of diphtheritic croup. He says: "I should think that of the cases of croup I have seen, at least nine tenths occurred after diphtheria." This suggests a temporary paresis due to the direct effects of inflammation.

Dr. Yeats (602) also mentions cases, but all were a part of an epidemic of diphtheria.

7. Have you seen in the same family at the same time, cases of croup in one member and of diphtheria in another; and have you any evidence to show that membranous croup is contagious, and capable by its contagion of producing diphtheria?

As regards the question of the possibility of *contagion* of membranous croup, by far the larger number of replies strongly negative the idea of such a possibility. Out of 28 who have answered this question, 25 answer in the negative, only 3 affirming the possibility of contagion.

Those who reply in the negative are—28, 43, 60, 79, 162, 205,

226, 231, 336, 339, 373, 388, 400, 420, 436, 496, 534, 585, 615, 618, 629, 622, 467, 567, 614, 643.

Two qualifications must be made.

Dr. RANSOM, of Nottingham (436), excepts cases in which diphtheria attacked the trachea and larynx so early and so severely as to make the pharyngeal affection relatively unimportant, which statement is only a confirmation of the same fact. But Dr. Ransom says that he has seen no cases of true croup in his own practice. All the others speak of it as personally known to them.

Dr. WILLIS, of Barnes (585), has seen no reason to believe in the contagiousness of diphtheria.

Those who make statements as to contagion in croup are—

641. One case stated.

Dr. TREND, of Southampton (534), makes an important statement on this question. "I have noticed in large families and boarding schools that sometimes membranous croup seems contagious, as more than one will take it, but this I have attributed to their being exposed to the same influence. I have never seen croup in one produce diphtheria in another. In the same family I have seen children with measles get croup, followed by diphtheria, while other members of the family had scarlatina."

Dr. LANGDON DOWN (158) also says: "I have known at the London Hospital two children with membranous croup brought from the same house, *but I have never known diphtheria to be produced in hospital from croup.*"

In reply to the inquiry as to the occurrence of croup with diphtheria in the same family, 23 state that they have never known them occur together.

Dr. WILKS says: "I have seen in the same family instances of the ordinary diphtheritic affection of the throat, and at the same time the laryngeal or croupous form. I have seen instances where the affection was confined to the fauces in one member of the family, where it extended to the larynx in another, and where it has commenced in croup in a third, showing how all these affections may be one and the same. In the last case, if it had occurred alone, it would probably have been regarded as the old-fashioned croup, being in no way distinguishable. I have no notes of any case where the disease began in the larynx and was regarded as simple croup, and subsequently other members of the family had the pharyngeal form, but I think I have seen instances of it."

8. Taking the pathological fact of false membrane limited, or chiefly limited, to the larynx and trachea, what evidence can you adduce as to its origin, on the one hand, in the specific poison of diphtheria, and, on the other, in a definite

exposure to cold, or any other cause of ordinary inflammation?

The replies to this question are few in number and not very decisive.

The question was framed partly with the object of deciding whether the *limitation* of the false membrane to the larynx and trachea was a point of importance in deciding whether it has its origin in a specific poison or no.

It is therefore important to ascertain whether in cases of undoubtedly diphtheritic origin such limitation of the false membrane is ever observed.

Dr. RANKE (435) mentions the case of a child in whom tracheotomy was performed for "membranous croup," having at the time no false membrane on the fauces. Three days later false membrane appeared on the fauces. Other members of the same family had at the time, or afterwards, true diphtheria of the fauces.

Dr. YEATS (629), in his pamphlet and reply, gives cases bearing on this point.

Dr. B. WOODMAN gives cases of laryngeal affection occurring alone in the case of an infant aged eighteen months and in another aged two months, and also others where other members of families to whom they belonged had diphtheria. He states that it was limited to air-passages.

In opposition to this view, that the false membrane in diphtheria may be limited to the larynx and trachea, are the statements of Sir Geo. Burrows and Dr. Long Fox.

Sir GEO. BURROWS (79) says: "I have never seen a case of croup arising in connection with diphtheria," and expresses his belief that when the poison of diphtheria is in operation it appears to affect several persons simultaneously or in rapid succession.

Dr. LONG FOX (205) states that he has never seen such limitation to the larynx and trachea in diphtheria, although he believes that in certain epidemics it may be so limited.

Dr. HARRY WELLS (567) draws attention to the "marked tendency that diphtheritic exudation affecting the fauces, tonsils, pharynx, and nasal mucous membrane, has to extend itself to the larynx and trachea, and even to the bronchial tubes, leaving slight traces of its original site."

On the second point, viz. whether such membranous exudation may be produced by exposure to "cold or other cause of ordinary inflammation" there are several very definite statements, some ascribing the origination to cold only, others to the influence of cold and other exciting causes of catarrh upon those suffering from the effects of other diseases, especially measles.

Sir GEO. BURROWS (79) says that he has frequently seen croup arise from a definite exposure to cold.

Dr. LONG FOX says: "Very many times in my practice has croup been referred to damp and cold. When my children were younger the imperfect drying of a washed night-nursery floor has on several occasions seemed the origin of croup." (It is difficult to believe that Dr. Fox is speaking of membranous croup only, yet he has so very clear views on the differences of diphtheria and croup, both as to characters of false membrane, &c., that if not so, it must have been an inadvertent statement.)

Dr. GRIGG expresses a belief that croup always arises from wet and cold.

Dr. O'NEILL, of Lincoln, states that he has generally made out satisfactorily to himself that the occurrence of false membrane limited to the trachea was due to exposure to cold or other causes of ordinary inflammation. He adds that he has seen an hereditary tendency to croup in families.

Dr. RANKE, of Munich, says that he has seen, in addition to the cases of diphtheritic croup, also cases occurring spontaneously and sporadically, where no other cause for the disease could be assigned than exposure to cold.

Dr. W. SMITH, of Clifton, expresses a belief in the occurrence from exposure to cold.

Dr. TREND, of Southampton, says: "To my knowledge I have never seen croup arise from the specific poison of diphtheria, but, as stated above, I have seen it often from that of measles. On the other hand, I have frequently traced it to exposure to cold, and seen in the same family some children from the same exciting cause with croup, and others with bronchitis. I have noticed that the children who get croup have generally disordered digestion and loaded bowels."

Dr. SQUIRE, in reply to this question, does not state whether he has seen false membrane limited to the trachea and larynx in diphtheria, but he says that mere exposure to cold will seldom of itself produce this result of inflammation of the larynx and trachea. It may require the presence of the specific fever of measles or of influenza, or the lowered health state produced by them, or by hooping-cough, or by overcrowding, to convert ordinary catarrhal inflammation into a deep-seated low form of inflammation. Individual susceptibility or idiosyncrasy is also of some account in the process." At the same time Dr. Squire agrees in the view that a great proportion of the cases of membranous exudation in the larynx and trachea occur in the course of diphtheria.

Mr. STRETTON says: "I never attended a case of croup without clear evidence as to cause in careless exposure or vile dietary errors."

Dr. SANSOM says: "I have never seen evidence which is

contrary to the conclusion that false membrane limited to the *trachea* takes its origin from exposure to cold or causes of ordinary inflammation."

Dr. MONTI states that he never saw croup of the larynx and trachea from diphtheria without other false membranes elsewhere.

Dr. BAKEWELL, in answering this question, makes statements of importance as to the non-existence of diphtheria in Trinidad before 1869, but does not state that croup existed either. Has not seen croup since he left England in 1866. Saw much croup, never diphtheria before 1857.

Dr. WOODMAN, on the contrary, gives cases of "croup" from diphtheritic contagion, but states that though he has seen false membrane from scalds, poisons, &c., when exposure to cold has produced laryngeal symptoms, he has never seen any false membrane. (This bears also on the question of production of false membrane by scalds and other severe irritants.)

The following statements by Dr. SANSOM bear on the subjects treated both in Questions 7 and 8, and may be here introduced.

"Seeing, then, that (*a*) cases having the clinical characters of true croup (and confirmed by the results of autopsies) go through their course without the *demonstrable* presence of false membranes, that (*b*) post-mortem examinations whereby such membranes are rendered evident occur in only a small minority of observations, and that (*c*) cases of moderate severity may recover in which the mucus expelled from the trachea exhibits no fibrillar or membraniform arrangement, I feel that I must protest against the definition which renders the demonstration of false membrane during life or after death a *sine quâ non* for the diagnosis of true croup. This, in my opinion, is equivalent to a *petitio principii*.

"It is possible, therefore, that my observations may be rejected by the Committee as not fulfilling the conditions of the inquiry, but I send them that they may be taken for what they are worth.

"In the cases I have designated 'true croup' the onset of the characteristic symptoms has been preceded by a malaise of not more than two or three days—the subjects have been in nearly every instance presumably healthy— *i. e.* presenting no signs of cachexia, but usually rotund and florid. The earliest stages have been those of catarrh, with uneasiness referred to the throat; there has always been some pyrexia; the dyspnœa, though subject to exacerbation, has been continuous and progressive.

"DIAGNOSIS A, from spurious croup, *i. e.* spasm of the adductors of the vocal cords. In the majority of cases this has been very easy. The conditions in the latter have been notably those of disturbance of the digestive organs, a proneness to intestinal worms, and, in a few cases, syphilis. The dyspnœa exhibits distinct remissions, either without obvious cause or in response to measures taken

to provoke enuresis, purgation, or inhalation of anæsthetics. In croup, on the other hand, though there are variations of intensity, provoked by cough and by conditions of irritability, there is, nevertheless, a steady increase in the dyspnœa, an advancing cyanosis, and impairment of peripheral circulation. In a few cases, however, the diagnosis may be difficult. In one case under my care there was no obvious remission of the dyspnœa, but in this instance the child was cachectic, and probably syphilitic. At the post-mortem examination no other sign was discovered than violet colouration (venous congestion) of larynx and trachea. It was probably an example of paralysis of the abductors of the vocal cords, but the child was too young to allow of a laryngoscopic examination being made. Where the vocal cords cannot be observed the diagnosis from true croup can be formed by the absence of pyrexia, and by the general dyscrasia."

"B, from diphtheria. I accept the definition of the Committee with this comment: That I have always observed the diphtheritic false membrane to originate upon the mucous surface of the tonsils, the pharynx, the uvula and palate, or the buccal cavity. The diagnosis from croup is afforded by—(*a*) the profound adynamia, (*b*) the secondary inflammation and enlargement of the neighbouring lymphatic glands, (*c*) the appearance of diphtheritic false membrane upon any wounded surfaces, (*d*) the infiltration of tissues contiguous to this membrane, with sloughing of the soft parts, (*e*) the occurrence of various nerve-paralyses at a later period of the disease, paralyses which I have never seen in the cases which have recovered from imminent death from croup attended with abundant tracheal false membrane, (*f*) the proved contagiousness of diphtheria; not a single case of contagion has been observed by me in true croup."

9. If you believe the two diseases to be identical in nature, on what reasons do you chiefly rely in forming your opinion?

(The larger number of the replies to this question are, strictly speaking, irrelevant, for they consist, either of a statement that the writer does *not* believe them to be identical, or of reasons for the belief that they are not so).

Only a few state their belief that the two diseases are identical, but some argue in favour of this view, though not committing themselves to a definite opinion.

Dr. Ransom says that he suspends judgment because he has only found after death in croup a little ulcer or signs of slight inflammation without false membrane, and of such cases he has seen very few. Of cases of true diphtheria, which might have been called croup, he has seen many. He inclines to the view that nearly all cases of membranous croup are instances of a mistaken diagnosis.

(Dr. SHEARMAN, of Rotherham, believes in their identity, but says that he was convinced by Dr. Geo. Johnson's paper, not by his own experience.)

Dr. RANKE, of Munich, believes that nine tenths of the cases of croup are due to the diphtheritic poison, but he believes that it may arise from other causes, though his own experience does not afford him any proof of it.

Dr. YEATS, of Bankfoot, believes them to be identical, but his experience is mainly derived from an epidemic of diphtheria and from scattered cases obviously closely related to the epidemic. The statements which he makes and the arguments employed evidently refer to croup of undoubtedly diphtheritic origin, and therefore hardly bear on the question at issue.

Prof. STOERCK makes a positive statement that they are identical, but his statements are open to a similar objection.

Dr. BATHURST WOODMAN, whose experience seems to have extended over a wide area, makes some important statements, but their value is diminished by the fact that all cases in which the false membrane is limited (or apparently so) to the larynx and trachea, even where there is definite evidence that the disease is of diphtheritic origin, are spoken of by him as "croup," and this must be considered in judging of the statements. Thus, he gives three cases of croup, one of a girl, aged eighteen months, suffering from laryngeal diphtheria, and the brother, four years old, at the same time with false membrane on the mouth and pharynx. In another case, two children brought to the London Hospital, one with diphtheria, the other with "croup," and another died of "croup" the ages (are not stated). Another case, in which a child, three years old, went home to Torquay with paralysis of the pharynx and a patch of false membrane on the tonsil, and slept with an infant brother, two years of age, who caught "croup" and died. These cases show only what was already recognised, viz. the existence of membranous laryngitis due to diphtheria. On the other hand, Dr. Woodman makes the important statement that "he has seen false membrane from scalds, poisons, &c." He adds that when exposure to cold has produced laryngeal symptoms he had never seen any false membrane. Dr. Woodman's experience includes about fifty cases of diphtheria and croup seen in general and hospital practice. Dr. Woodman also refers to the returns of the Registrar-General, as showing how diphtheria has replaced croup.

These are all the more important arguments advanced in favour of the view of the "identity" of diphtheria and croup. Other replies sometimes repeat one or two of these, but need not be given in detail.

On the other hand, there is a large numerical majority of those who express a belief that membranous croup is not in all cases to be ascribed to diphtheria. The greater number have simply

recorded their opinion to this effect, but some few have given the ground on which it is based. As these are to a great extent similar on some points in particular, these points may first be considered together, and then any special grounds of distinction stated.

1. The general condition of the patient. Great stress is laid on this by several observers. It is stated that asphyxia is the sole or most prominent symptom in croup, whilst asthenia is usually combined with the asphyxia in diphtheria. Connected with this is the mode of onset before the laryngeal symptoms have become prominent. It is also held by most of those who state these distinctions, that the treatment which is successful in the one class is not so in the other, that the one requires an antiphlogistic, the other a stimulant treatment.

The chief names of those who especially insist on this point are:—Dr. Barratt, Dr. Duckworth, Dr. Long Fox, Mr. Gaskoin, Mr. Humby, Mr. Leach, Dr. O'Connor, Dr. Southey, Dr. Maclean, Dr. Alois Monti, Dr. Pye-Smith, Dr. Sansom, Dr. Wells, Mr. Irving, Dr. Tenderini. All these express and others imply that there are very marked distinctions in this respect.

2. The infectious character of "croup" when of diphtheritic origin; the comparative absence of infection in other cases.

This point is especially referred to by several, but no further facts are adduced in support of it than those already given. Dr. Barratt, Dr. Duckworth, Mr. Leach, Dr. Maclean, and Dr. O'Connor, especially lay stress upon this. (But it is only fair to say that they appear to speak of diphtheria as a whole, and not merely of the contagiousness of the special class of cases of purely laryngeal diphtheria as contrasted with the presumedly non-diphtheritic class.)

3. The different nature of the exudation in the air-passages.

Dr. Long Fox and Dr. Lionel Beale especially refer to this as distinctive, but they give no precise information as to the exact nature of the difference.

4. The locality of the false membrane.

The principal questions which arise under this head are—*a*. Does false membrane ever occur in the fauces in cases of non-diphtheritic croup? *b*. Are there cases of diphtheria in which false membrane is entirely limited to the air-passages? *c*. Is there a greater tendency for the false membrane to spread to the bronchi in diphtheritic than in non-diphtheritic croup?

Dr. Duckworth, Dr. Long Fox, Dr. Greene, Mr. Hutton, Dr. Laycock, and Dr. Southey, all insist upon the limitation of the false membrane to the larynx, trachea, and bronchi, as peculiar to croup, but they do not state certainly that such limitation is impossible in diphtheria, nor do they give any precise information upon it.

5. As to the age at which "croup" occurs the statements are few. One answer states that croup does not occur after five years of age; another that it spares early infancy.

6. Glandular swelling in the neck is one point especially insisted on by Dr. Duckworth, Dr. Pye-Smith, and Dr. Wells. They state that it is universal in diphtheria, but absent or nearly so in croup. (They do not, however, say whether this may not depend upon the part affected.)

Such are some of the principal grounds on which the distinction is based. Some few remarks upon other points which may aid in the consideration of the subject may be added.

Dr. Price Jones lays especial stress upon the difference of climate and locality in relation to the two forms, contrasting his experience in practice in different localities. In Wales he found the laryngo-tracheal affection common, whilst in Surbiton he has observed the throat affection to prevail especially. (It is not stated whether this is to be regarded only as evidence that climate influences the part affected).

Dr. Laycock says a false membrane is only a limited part of the anatomy of diphtheria, whereas it is the chief anatomical characteristic of croup.

Dr. O'Connor (whose experience appears to have been exceptionally great) draws especial attention to the fact of the occurrence of diphtheria in the children of the poor, especially those in a low condition, whilst the cases of "croup" in his experience were chiefly among the well-to-do.

Dr. Wells says: "My experience hitherto does not lead me to conclude that these diseases are identical in nature. I would classify croup as an inflammatory affection of the trachea, below the glottis, with exudation of albuminous material, accompanied by spasmodic action of laryngeal muscles, attacking children from the eighth month up to the seventh year; whilst diphtheria is pre-eminently a specific disease, rapidly producing profound alterations in the blood, occurring in all climates and all seasons, and, in contra-distinction to croup, affects subjects of *all* ages, and is exceedingly contagious.

Dr. Alois Monti says: "From a clinical stand-point it cannot be certainly decided whether the two diseases are identical. If one also considers that the two are only different degrees of the same affection, the difference of the clinical apppearance must be treated, the grounds of which are: Croup is a local affection of the larynx and trachea, while diphtheria is a general infectious disease, with localization in the pharynx, larynx, trachea, &c. Croup is, like every inflammation, induced by cold (erkältung); diphtheria by a specific contagium. Croup is not contagious; the power of contagion of diphtheria is allowed. Croup runs its course only as a local disease, and kills only as a consequence of stenosis, diphtheria runs the course of a general infectious disease that

kills rather as a consequence of blood poisoning than by sequel of stenosis. Croup never leads to paralysis, nor is there ever disease of the kidneys during it; in diphtheria this is highly prevalent.

"The lymphatic glands are either not swollen in croup, or only in a slight degree. In diphtheria the lymphatic glands are constantly swollen, and it depends upon the stage of the disease whether this results in virulent inflammatory buboes."

10. If you have any hospital experience, or experience derived from a large school, will you be pleased to give the Society the benefit of it?

In the replies relating to school and hospital experience, some important facts are stated.

Dr. Langdon Down, in an experience of ten years at Earlswood Asylum, says that he has never seen a case of membranous croup among the inmates, though laryngismus stridulus frequently. Diphtheria in mild forms epidemically two or three times.

Dr. Clement Dukes, during five and a half years of experience at Rugby, and as physician to Rugby School, has never seen a case of croup, and only one of diphtheria.

Dr. Long Fox, as the result of nineteen and a half years of experience as physician to the Bristol Infirmary, states that he has seen a large number of fatal cases of diphtheria and croup, and autopsies. He draws marked distinctions between the two (for which see elsewhere), saying that he has never seen a case of croup where the false membrane was above the glottis, nor ever a case of diphtheria where it was not above.

Mr. French, as the result of forty years' experience as medical officer of St. James's Parish, with charge of the workhouse and supervision of the parish schools at Brentford and Wandsworth Common, has seen no marked epidemic of diphtheria, but cases of croup in infants occasionally, which usually yielded to leeches and antimony.

Dr. Lownds has seen no cases of membranous croup, but cases which, he believes, would have gone on to membranous if left alone. Ipecacuanha emetics caused vomiting of a pultaceous mass, and no further symptoms occurred. The convalescence was "quite different" from that in tracheal diphtheria.

Dr. Norman Moore makes the following statement: "In St. Bartholomew's Hospital I have often seen croup, and rarely diphtheria, 1869—76."

But Dr. Reginald Southey, drawing his experience from the same hospital and from dispensary practice, says "that at St. Bartholomew's he has had under his care many cases of croup

and of diphtheria. The cases of croup die, without a single exception, with symptoms of suffocation. A certain proportion of the cases of diphtheria recover, these last never fail to present albumen in their urine, and are often, but not invariably, succeeded by some local and in some cases general spinal paralysis.

"The cases of croup occur sporadically, one member of a family only is affected at a time, and the disease does not spread in the neighbourhood."

"The cases of diphtheria have appeared to be highly communicable; wherever I have seen one case in a family, other members of the same family have become affected within a short space of time (three days to six weeks). Last year I had four cases of diphtheria from one house in St. Pancras Parish, two children, father and mother, all died with symptoms of well-marked blood poisoning and local throat and tonsillar deposition. They died when they were apparently better and beginning to convalesce quite suddenly by asthenia or sudden heart arrest."

Dr. O'Connor says that croup may be membranous or not, hence does not distinguish.

Dr. O'Neill, of Lincoln, gives some facts indicating that (as is commonly believed) croup does not occur over ten years of age, and that "croup" is not contagious, whilst diphtheria is highly so.

In a girl's school (ages from ten to eighteen) he never saw a case of croup in some years, but a case of diphtheria which was sent him infected *three* adults with diphtheria. In contrast with these, he had two cases, aged three and five, of croup in different families, one in Lincoln, the other in the country, at the same time; both were in families of children, but although they could not be kept separate from the others, and one died (the other recovered), no one else took the disease. This fact alone would be of great value in showing that either croup is distinct, or that there is far less liability to spread contagion when the larynx and trachea only are affected.

Dr. A. J. Pollock during a period of twelve years as physician to the Foundling Hospital, states that he has never seen a case of croup, and only three of diphtheria, which occurred at once, and two were fatal. In his other hospital experience at King's, and Charing Cross, he has seen no diphtheria and only about six of croup.

Dr. Ransome, of Nottingham states that, during twenty years as physician to the General Hospital, he cannot remember having seen more than two or three cases in the wards, but during the same time his private cases had been nearly one hundred. (Dr. Ransome is speaking of diphtheria, as he says that in croup he has found only a little ulcer in the larynx, no false membrane. The peculiar circumstances possibly account for this exceptional experience).

Dr. SHEARMAN, of Rotherham, as physician to the Rotherham Hospital for six years, has only seen one case of croup, speedily cured, and no diphtheria.

Mr. LAWSON TAIT speaking of cases in which he has done tracheotomy, states that in those where the operation was for false membrane, solely below the epiglottis (believed to be true croup), and where the false membrane was expelled and seen, they recovered with no paralysis, but where false membrane extended over the fauces, well-marked "diphtheritic paralysis" was seen in several. His experience seems to have been pretty large and unbiassed.

Dr. CHAS. BELL, of Edinburgh, has had large school experience, and also private practice. He strongly denies the identity of croup and diphtheria, as regards mode of extension and treatment, and epidemic nature of diphtheria. He states that in croup the false membrane *ascends*, in diphtheria *descends*, and the latter may alway be checked by local application (Condy's fluid).

Dr. PYE-SMITH does not say that he has had any experience of membranous laryngitis or acute catarrhal suffocative laryngitis apart from cases of undoubted diphtheria. This he states definitely with regard to adults. He mentions three fatal cases due to diphtheritic contagion in adults under forty. "In all the fatal cases he has seen death appeared to be directly due to extension of inflammation through the bronchial tubes, producing dyspnœa." He believes "that in hospital practice in London diphtheria is more common than croup, even in children." He believes that the characters which suffice to distinguish diphtheritic cases are the appearance and structure of the membrane, its locality, the general symptoms, onset, fever, albuminuria, and paralysis; aided during life by (1) the age of the patient, (2) the occurrence of more than one case at a time. But when membranous laryngitis is once established from whatever cause, and spreads downwards, the subsequent course of the local disease in the air-passages is much the same. He does not regard all membranous laryngitis as diphtheritic.

Dr. W. SQUIRE speaks from considerable experience of parochial institutions for children, and other parochial experience. He states that the cases of croup were all brought into the infirmary from the poorer and more densely crowded parts of the parish. An inspection of the home conditions under which they occurred showed that the rule was that several children slept with their parents in very limited, and often insufficient, air-space, and that there were no instances of more than one child suffering in a family. At the same time there were no cases of croup amongst the children in the workhouse and parochial schools, who were all together in one house. Vaginal diphtheritis was once or twice epidemic. Dr. Squire also states that he had four cases of croup in one month at the St. George's

(Hanover Square) Dispensary (this was at the end of March), and no other cases in the rest of the year.

Dr. SANSOM has had large experience of children at the North-Eastern Hospital for Children, and very strongly distinguishes croup from diphtheritic laryngitis, stating the views usually received by the adherents of this view, and insisting very strongly upon the fact of non-contagion in the cases of laryngeal membranous exudation not of diphtheritic origin. His experience includes some twenty cases of "croup."

Dr. WELLS, of Gualeguaychu, speaks with hospital experience, and gives valuable facts, but more under previous questions.

Dr. GRIMSHAW, of Dublin, has had no experience of croup in hospital practice.

Dr. ALOIS MONTI forty years' hospital experience.

Dr. BAKEWELL, of Trinidad, not *specially* hospital.

Dr. BATHURST WOODMAN speaks from experience of about fifty cases at the London Hospital, North-Eastern Hospital for Children, and general practice in various parts of England. Dr. Woodman believes that all croup is laryngeal diphtheria, but states that he has seen false membrane from scalds, poisons, &c.

The late Dr. LAYCOCK thus sums up his experience: "I have been Clinical Professor for twenty-one years in the University of Edinburgh, and as Professor of the Practice of Medicine I have had to weigh the evidence given on both sides of the question. I have come to the conclusion that the two diseases are wholly different. I have seen cases of diphtheria in which the most careful observation could detect only very slight specks on the fauces to be followed by diphtheritic paralysis. Again, I have known the so-called hospital sore throat, with primary symptoms of no importance, become rapidly fatal as diphtheria, apparently from palsy of the respiratory system. Diphtheria is a highly proteiform disease, and is manifested in every degree of severity according to the state of the individual and his surroundings, and in many cases there is little faucial disturbance. On the other hand, croup is not proteiform, but is—croup."

Dr. OSCAR WYSS says: "My experiences are, *diphtheritis* is a contagious specific disease; *croup* is only a very high degree of inflammation, with exudation of fibrinogenous matter."

Dr. WILKS has given the results of his observations in reply to questions 8, 9, and 10, in the following words:

"I should say, therefore, that the symptoms alone and the post-mortem appearance of the affected parts are not sufficiently characteristic to enable us to distinguish between the two supposed different forms of the membranous disease. My opinion was long undecided about the anatomical differences of the two, but I now think that if there be a difference it is not sufficiently marked to frame a diagnosis. I would not allow, however, on general pathological grounds that similar morbid states establish

an identity of cause, for by way of illustration I might mention that a case of idiopathic dysentery might not be distinguishable from the inflammation produced by a poison. On the post-mortem table we might see two bodies whose death was caused by pneumonia or peritonitis, the one the result of septicæmia and the other of direct injury, the pathology in those two cases being of a totally different kind. It is true that further knowledge might enable us to discern differences in the blood of each, but at the present time, with the simple anatomical facts before us, we must admit identity of appearances having different causes for their production."

"I would also remark that I think we cannot restrict the question of membranous or croupous inflammation to a defined line at the termination of the trachea. It is true that in most cases the membrane occupying the larynx and trachea ends at the bifurcation, and then gradually becomes loose and passes into a mucous secretion, but I have seen cases of undoubted diphtheria and others of questionable origin where the membrane has passed into the bronchial tubes, so that they have been ejected in an arborescent form, or have been found occupying all the bronchial ramifications after death. It is not likely that a distinct line should separate two different morbid processes. I should say, therefore, that the question cannot be confined to the larynx and trachea, but must include the whole of the air passages."

"The pathological question, then, is—*Is there such a thing as an idiopathic membranous inflammation of the air-passages?* This has been unanimously believed up to the present time, but now is denied, the declaration now being that a membranous inflammation of the air-passages is ALWAYS *due to the influence of an external specific agency.*"

"My own view has reached at present thus far—that membranous inflammation of air passages may be due to an external specific cause known as diphtheria, and very often when it is regarded as idiopathic subsequent events will show its specific origin. I could not, therefore, in any given isolated case say, from symptoms or post-mortem appearances of air-passages, that it was not of diphtheritic origin. At the same time, because of this possible fact, I do not think we are yet in a position to justify the statement that it must be so, or that it may not have occurred spontaneously, for the ordinary proof of diphtheria is wanting in a large number of cases. Although I am not wedded to any old opinion, I cannot but hesitate to hurriedly deny a doctrine universally held. It must be known that every pathologist in the world (I believe) has described two forms of idiopathic inflammation of the air-passages, the catarrhal and croupous or membranous, and that every clinical physician has assented to this division. The new doctrine is an absolute denial of this, and that only one form, the catarrhal, exists; the other, the

membranous, is due, it is said, to an extraneous cause. It is not said that the inflammation may be sometimes of one kind or the other, for this is the old and generally received opinion, but that there is no such thing as an idiopathic membranous inflammation of the air passages."

"Modern observation has clearly shown that the latter is frequently the result of an external cause, but are we from this fact to deny the possibility of its spontaneous occurrence? It may certainly occur as a result of artificial irritation, as from steam, but this is objected to as too violent a cause."

"Denying, therefore, that the proof can lie in the consideration of symptoms or anatomical changes, it must be founded on clinical observation over a long series of years. If it be found that a large number of cases of membranous croup occur in isolated spots without the presence of marked diphtheria in the neighbourhood, and in these cases there be no albuminuria or other marked constitutional disturbance, I see no reason why they should not be regarded as of idiopathic origin."

To facilitate reference, and to avoid unnecessary repetition of names, the following list of some of those who have sent replies is given. The number appended to each name is that which was attached to the copy of questions sent to each Fellow, and served as a reference.

19. Dr. Bakewell, Trinidad.
23. Dr. Whyte Barclay, St. George's Hospital.
28. Dr. Gillmann Barratt, Bayswater.
34. Dr. Lionel Beale, King's College Hospital.
43. E. U. Berry, Esq., Gower Street.
60. Dr. R. L. Bowles, Folkestone.
70. Chas. Brooke, Esq., F.R.S., London.
79. Sir Geo. Burrows, Bart., M.D., London.
140. Dr. J. E. Currey, Lismore.
158. Dr. Langdon Down, London Hospital.
162. Dr. Dyce Duckworth, St. Bartholomew's Hospital.
167. Dr. Clement Dukes, Rugby.
175. Dr. Eager, Bristol.
199. Dr. Fitzpatrick, Sussex Gardens.
205. Dr. Long Fox, Clifton.
209. J. G. French, Esq., Maida Hill.
216. George Gaskoin, Esq.
217. John Gay, Esq., Great Northern Hospital.
226. Dr. W. T. Greene, Old Kent Road.
231. Dr. Grigg, Westminster Hospital.
242. J. F. Harding, Esq., Uckfield.
269. M. Berkeley Hill, Esq., University College Hosp.
284. Dr. E. Humby, St. John's Wood.
291. Dr. Chas. Hutton, Belgrave Square.

299. Dr. Jacobovics, Vienna.
311. Dr. Price Jones, Surbiton.
315. Dr. Kendell, Wakefield.
318. J. A. Kingdon, Esq., Lothbury.
326. Dr. T. Laycock, F.R.S.E. (the late), Edinburgh.
327. Jesse Leach, Esq., Heywood.
336. Dr. Oscar Wyss, Zurich.
337. T. Longmore, Esq., C.B., Netley.
339. Dr. Lownds, Egham (late of Bombay).
340. J. Luke, Esq., London Hospital.
346. Dr. R. M'Donnell, St. Steven's Hospital, Dublin.
359. John Marshall, Esq., F.R.S., University College Hospital.
373. Dr. Norman Moore, St. Bartholomew's Hospital.
388. Dr. Nicholls, Chelmsford.
393. Dr. O'Connor, March.
400. Dr. O'Neill, Lincoln.
404. Sir James Paget, Bart., F.R.S., London.
420. Dr. A. J. Pollock, Charing Cross and Foundling Hospitals.
421. G. D. Pollock, Esq., St. George's Hospital.
423. Dr. G. V. Poore, London.
435. Dr. Ranke, Munich.
436. Dr. Ransom, Nottingham.
466. Dr. W. H. O. Sankey, University College.
467. Dr. A. E. Sansom, London Hospital.
475. Dr. W. Sharp, Rugby.
478. Dr. Shearman, Rotherham.
492. W. Smith, Esq., Clifton.
496. Dr. Reginald Southey, London.
517. Lawson Tait, Esq., Birmingham.
531. Dr. Tilt, London.
534. Dr. Trend, Southampton.
560. Sir Thomas Watson, Bart., F.R.S., London.
567. Dr. Harry Wells, Gualeguaychu.
576. Dr. Samuel Wilks, Guy's Hospital.
580. Dr. C. T. Williams, Brompton Consumption Hosp.
585. Dr. Willis, Barnes.
590. G. L. Wood, Esq., Bath.
594. W. C. Worthington, Lowestoft.
596. Prof. Maclean, Netley.
598. Dr. Charles Bell, Edinburgh.
602. Dr. W. Yeats, Bankfoot, near Perth.
610. Dr. Pye-Smith, Guy's Hospital.
614. Dr. Grimshaw, Dublin.
615. Dr. Painter, Beaufort Gardens, London.
618. Dr. T. Stevenson, Guy's Hospital.
622. Dr. Alois Monti, Vienna.

624. Dr. W. Squire, London.
629. Mr. Stretton, Kidderminster.
631. Dr. Thorne Thorne, London.
634. Dr. P. Duncan, Croydon.
636. Dr. Stephen Monckton, Maidstone.
638. Sir J. Rose Cormack.
639. Dr. Gowan.
641. Mr. G. B. Irving, Stanmore.
Dr. Macpherson.
645. Mr. J. Southern, Ludlow.
Dr. Beeby, Bromley.
Dr. Bowles, Folkestone.
Dr. Hoggan, London.
Dr. Whitehead Reid, Canterbury.

And some others, merely formal.

APPENDIX II.

REPORT ON THE HISTORY AND EARLY LITERATURE OF THE SUBJECT.

In reviewing the historical evidence bearing upon the present question many difficulties present themselves, in consequence of the loose manner in which the term "croup" has been employed, and of the absence of the word altogether in medical or any other scientific writings before the publication of Dr. Home's treatise. The word "diphtheria" or diphtheritis never appears until after the publication of Bretonneau's Memoir in 1826. Nevertheless, the disease to which the word is attached has probably existed from all antiquity, and its history must be traced under other names. Another difficulty to be most carefully avoided is the following. The present investigation being directed to prove the identity or non-identity of "membranous croup" and "laryngo-tracheal diphtheria," and not to establish the diagnosis between a disease essentially characterised by the presence of false membrane, and some other disease in which there is no false membrane at all, it is necessary to exclude carefully from consideration many of those cases which pass popularly under the designation of croup, such as laryngismus stridulus, non-membranous laryngitis, and, it may be added, cases of tumours in the larynx, foreign bodies in the larynx, aneurisms pressing upon the recurrent laryngeal nerve, &c., in all which there may be what are called "croupy" symptoms. The inquiry, therefore, for present historical purposes, must be strictly confined to those cases where there is distinct evidence of a false membrane in the larynx and trachea, in either or in both.

Bretonneau, in all his writings, draws a distinct line of demarcation between "diphtheria" and ordinary laryngeal inflammation, on the one hand, and laryngismus stridulus on the other; and the only question to be determined is really whether the disease he described as tracheal, or laryngo-tracheal, diphtheria is different from what, before his writings appeared, was known as "membranous croup." He himself declares that they are exactly the same, and he also traces the history of what *he* calls "tracheal diphtheria," and what *others* call "membranous croup," to a very remote antiquity, long before either of these names was employed. The following historical summary will throw some light upon this difficult question; and it must be mentioned at

the outset that every possible care has been taken to eliminate from the field of investigation all cases in which there was no false membrane.

That a disease characterised by the presence of a false membrane in the larynx or trachea, or in both, and attended by great fatality, has prevailed in the world from the remotest period is in the highest degree probable, but the Greek writings on medicine, which are amongst the earliest medical treatises in existence, are too vague in their descriptions to enable us to affirm that any disease exactly resembling that now known as membranous laryngitis was known to or observed by the Greek physicians. The passage in Hippocrates, which is sometimes referred to as relating to diphtheria, contains only some vague descriptions of a complaint in the throat which would apply as well to cancer, or tonsillitis, or malignant scarlatina, or tertiary syphilis, as to diphtheria or membranous croup. The description given by Aretæus, although more definite than that of Hippocrates, is far from conveying to the mind any distinct idea of diphtheria, and a careful examination of his chapter in the original Greek, *περὶ τῶν κατὰ τὰ παρίσθμια ἑλκῶν*, leaves the reader quite in doubt whether the author described an ordinary "ulcer" or a membranous formation in the fauces, but the critical study of the original Greek words rather leads to the former view. The writings of Celsus contain no more definite descriptions of diphtheria than those of Hippocrates, and they are even less definite than those of Aretæus.

It would appear that an epidemic of tracheal diphtheria prevailed in Paris towards the end of the sixteenth century, for Baillou (Ballonius), writing in 1576, writes thus: "Chirurgus affirmavit se secuisse cadaver pueri ista difficili respiratione et morbo (ut dixi) incognito sublati; inventa est pituita lauta, contumax, quæ instar membranæ cujusdam arteria aspera erat obtenta, ut non esset liber exitus et introitus spiritui externo: sic suffocatio repentina."

But at the commencement of the seventeenth century there is no doubt whatever that a disease exactly resembling the tracheal diphtheria of Bretonneau prevailed extensively in Spain, and was accurately described by the Spanish physicians of that period. Their names are Herrera (Christopher Percy de), 'De Essentiâ &c., Morbi Suffocantis Garrotillo Hispané appelati,' published at Madrid in 1615; Fontecha (J. A. de) 'Disputationes Medicæ,' published at Alcala in 1611; and Villa Real (J. de), 'De Signis &c., Morbi Suffocantis,' published also at Alcala in 1611. The following description, out of many given by these writers, is quite conclusive as to the nature of the disease they witnessed. Villa Real describes "quasdam velut membranas cingentes fauces, et tali constantes modo substantiæ, ut si propriis manibus tendas, videas ejus partes cedere, quas,

si desinas, videas refluere, propriumque adquirere locum, non secus ac si corium madidum aut membranam madidam tendas et sinas. Hoc experientiâ didici," he says, "tum in viventibus excretâ causâ per os, tum in morientibus factâ anatomiâ." Here he distinctly indicates the false membrane resembling moist leather, stretching and relaxing under the hands, and he states that he has seen it both when thrown up by the mouth and when examined in the bodies after death.

About the same period epidemics of exactly the same nature occurred in some parts of Italy, and they are described by Carnevale, in a treatise 'De Epidemico Strangulatorio Affectu,' published at Naples in 1620, and by Nola, in a treatise 'De Epidemio Phlegmone Anginoso grassante Neapoli.' and published at Venice in 1620. A similar epidemic is described by Cortesius as raging at Messina, in Sicily, in 1625.

There are not many more distinct records of the disease in the seventeenth contury, but in the eighteenth they are abundant. An epidemic is described as prevailing at Cremona, in a small work called 'Lettere Mediche,' published by Martius Ghisi in 1749; another was witnessed in Sweden, and was described by Wilcke in a work entitled 'De Angina Infantum' published at Upsala in 1764; a most graphic account of one occurring in Picardy, in France, was published by Marteau de Grandvilliers in a work entitled 'Description des Maux de Gorge Epidémiques et Gangréneux qui ont regné à Aumale et dans le voisinage,' Paris, 1768; and similar epidemics were described by Bard in 1771, as having occurred at New York, and by Starr, as having broken out in Cornwall.

In all the epidemics just referred to it must be distinctly understood that in every instance the false membrane in the windpipe is clearly indicated by the respective authors. As a specimen of the description, the following may be quoted from Wilcke's Dissertation on the 'Disease in Sweden.' When describing the appearances found in a post-mortem examination made by Dr. Rolandus Martin, he writes: "Asperam arteriam intus undique singulari inductam membrana observavit quam sponte fere nexu omni solutam, peculiaris tubi instar, extraxit; crassiore; grisea et ex putredine laciniosa qua cavum sui spectabat; qua vero asperæ arteriæ adhæserat, sanguineo-purpurea. Quo longius in pulmones descenderet, eo pallidioris fuit ruboris, et in subtilissimis quidem bronchiorum ramis prorsus albicans, speciem præbuit membranæ, quæ ovi putamen intus investit."

The epidemics described by Fothergill and Huxham in the last century, and which have been sometimes regarded as proving the prevalence of diphtheria, are here purposely omitted from consideration, because it is quite evident, from a perusal of the works of those authors, that the diseases they described were some

aberrant forms of scarlatina, with which tracheal diphtheria has no necessary connection.

In 1765 Francis Home described a disease which he witnessed on the east coast of Scotland. He appears to have known nothing of the works of any of the authors already cited, and he considered the disease he witnessed to be a new one, and he described it under the name of "croup," a Scotch word first introduced into medical literature by Dr. Blair, of Cupar Angus, in 1713. Home's cases are only twelve in number, and of these three appear to be cases of non-membranous laryngitis. Nine of them, however, are undoubtedly instances of membranous laryngitis, or at least Bretonneau considered that they correspond exactly to the description which he afterwards gave of laryngo-tracheal diphtheria.

At the very commencement of the present century, namely in 1801, appeared the essay 'On Cynanche Trachealis or Croup,' by Dr. Cheyne, and this work requires very careful consideration in connection with the present Report, because it is from Dr. Home and Dr. Cheyne that the word "Croup" has been introduced into the language of medicine, and the descriptions of these two authors have been adopted by most subsequent writers. His cases are only ten, and, out of these, three are not his own. Five of them terminated favorably, and as Dr. Cheyne believes, in consequence of bleeding and purging, but, as in them no false membrane is described, it may be fairly a question whether these cases were not instances of non-membranous laryngitis. Five cases were fatal in spite of all treatment, and in four of them the false membrane is not only described, but is very admirably drawn and coloured, the artist being no less a master in pictorial art than the afterwards distinguished Sir Charles Bell. The examination of these plates leaves no doubt whatever that membranous exudation existed. Cheyne appears firmly to believe that the false membrane is the result of the inflammatory action, and that its appearance may be prevented by bleeding and purging.

After the appearance of Dr. Home's and Dr. Cheyne's treatises the word "Croup" began to be employed to designate the disease characterised anatomically by the presence of a false membrane in the larynx and trachea, and which had been previously knowu under the names of Garrotillo, Morbus Strangulatorius, Male in Canna &c. The occurrence of the death of the grand-daughter of the French Empress Josephine, in 1807, from this affection,[1] induced the Emperor to offer a large prize for the best essay on tho disease, then known as "Croup;" and the chief object of this prize was to lead to some suggestions as to the best mode of cure.

This era is important in the present investigation, because the occasion produced a multitude of essays, not only from French,

[1] A tubular false membrane was found in the child's body after death.

but other authors, who were attracted by the great value of the prize and by the hope of distinction, and the award was finally divided between two aspirants, namely, Albers, of Bremen, and Jurine, of Geneva. The essay of Albers is written in Latin, and is entitled 'Commentatio de Tracheitide Infantum, vulgo Croup vocata,' and it was published at Leipzig in 1816. The essay of Jurine was written in French, but his work is very scarce, and is only met with in a German translation. Other essays on the same subject sent in for competition were by Double ('Traité du Croup,' Paris, 1811), by Vieusseux, ('Mémoire sur le Croup,' Genève, 1812), Valentin, ('Recherches historiques et pratiques sur le Croup,' Paris, 1812), and some other treatises were written (although not for the competition) on the same subject by Desruelles, Guibourt, Caillou and others.

Although the essays thus written all adopted the name "croup" as indicating the disease they described, it is very evident from a perusal of the works that the authors invariably described at least three different diseases under the same word, and that all throat affections, in fact, were by them called "croup," especially if they occurred in children. Albers, who gained the prize, and who may be supposed to write authoritatively on the subject, clearly regards croup as a disease offering many and very different characters, according (1) as it is or is not accompanied by a false membrane, or (2) as the nervous or inflammatory symptoms preponderate; and although he expresses his opinion that "morbus noster consistit in membranæ pituitosæ tum laryngis, tum arteriæ asperæ et ramorum ejusdem inflammatione," yet he is evidently of opinion that the "lympha plastica" which is developed by that inflammation may be arrested in its development, or absorbed after its effusion, by appropriate medical measures. His own success in the treatment was extraordinary, and in the few cases where the patients died the result, he says, was entirely due to the fact that the remedial measures (chiefly bleeding and mercury) were not adopted sufficiently early or with adequate vigour. The history of one of his unsuccessful cases "clearly shows us," he says, "nos aperté docet, remedia statim ab ejus principio maxime festinanda esse, propterea quod periculum in levissima versetur mora." It is unnecessary in the present day to comment upon these views, and it is quite evident that the majority of cases said to be so successfully treated by Albers were cases of non-membranous laryngitis, and not of the disease which forms the subject of the present Report.

The essay of Jurine, which, as before mentioned, is very scarce, and only exists in England as a German translation by Albers, advocates exactly the same views as the latter author, and places the same reliance on antiphlogistic treatment. Jurine gives from his own experience twenty-eight cases of "Croup," of which

only three were fatal—a result which almost in itself proves that the author did not witness cases of membranous laryngitis, the mortality of which is notoriously excessive. Even of the fatal cases, it is more than probable that two of them, judging by the description, were instances of non-membranous laryngitis. Jurine evidently believes that the antiphlogistic treatment, as it is called, prevents the formation of the false membrane, "Die erste indication bei dieser Krankheit ist nicht das Koncrement wegzuschaffen, sondern dessen Bildung zu verhüten." He there-therefore strongly recommends bleeding to effect this object. Like all the other essayists, Jurine makes no attempt whatever to show that there are two diseases, both of which produce a pseudo-membranous exudation in the larynx and trachea.

But the other essays sent in for competition are almost exactly of the same character as those of Albers and Jurine, except, perhaps, that they do not all so loudly and confidently extol the value of curative measures. They all, in fact, regard "croup" as divisible into three categories, namely, 1, where a false membrane is found in the windpipe; 2, where there is no false membrane, but where inflammatory symptoms exist; and, 3, where there is a preponderance of "nervous" symptoms. In other words, they include under "croup," 1, membranous laryngitis; 2, non-membranous laryngitis; and 3, laryngismus stridulus.

Excluding non-membranous laryngitis and laryngismus stridulus, and endeavouring to extract from the French essayists of the period now referred to, any information as to the divisibility of membranous croup into that caused by common inflammation and that due to epidemic influence or contagion, the inquiry is hopeless and the results are negative. The authors all regard the false membrane as the result of an inflammatory process, and their curative measures are directed with a view to subdue the inflammation, and thus either to prevent the formation of the false membrane, or to cause its absorption when it has been developed. Whether the means they recommended, which consisted in copious bleeding, the administration of mercury, and other so-called antiphlogistic measures, ever really effected these objects it is scarcely worth while in the present day to inquire.

While the scientific features of "croup" were thus represented by a large number of French writers, the epidemics of Tours presented themselves to the notice of Bretonneau, and it is necessary, in an historical point of view, to fix accurately the dates of the French writings just referred to, and that of the outbreak of the first Tours epidemic. It will be seen that the 'Essays' appeared in 1811, 1812, and 1816, and the first epidemic witnessed by Bretonneau occurred in 1818. Bretonneau, therefore, who was well acquainted with medical literature, must have been fully aware of the existing doctrines on the subject of

"croup," and he, indeed, adopted the word himself. But he saw that the "croup of his contemporaries comprised at least three different diseases, as has been indicated in a previous page, and he therefore proposed the word "diphthérite" to indicate that form of croup which was attended by the presence of a false membrane in the larynx and trachea. He himself first regarded the disease as inflammatory, and hence the name "diphthérite" (which, however, he subsequently changed for "diphthérie"), and he accordingly, at first, and under the influence of the then prevailing doctrines, endeavoured to combat the symptoms by bleeding, mercury, and other so-called antiphlogistic measures. But he soon abandoned them all as not only useless but injurious, and regarded the false membrane, not so much in the light of an inflammatory exudation, as a specific development of the disease arising from infection, and thus resembling in its nature the pustules of smallpox, the rash of typhoid, &c.

It is quite hopeless to search the writings of Bretonneau for any distinction between "pseudo-membranous croup" and "laryngo-tracheal diphtheria," for he evidently regards them as identical, and expresses himself repeatedly to that effect. Besides separating (1) "tracheal diphtheria" or "croup," or "vrai croup," as it is called by some very modern French writers, from (2) ordinary laryngitis and (3) laryngismus stridulus, *Bretonneau established the fact that in the majority of his cases of membranous laryngitis the affection of the trachea was attended by the appearance of the characteristic leather-like membrane on the fauces*, the latter appearance thus giving warning of the dangerous and generally fatal issue. He admitted, however, that in a certain number of cases the tracheal affection was not attended by any exudation on the fauces, and this form of disease is fully recognised by modern French writers, who call this form of diphtheria the "croup d'emblée."

In his earlier memoirs on diphtheria (1821-26) Bretonneau made it his principal object to prove that that disease and croup are identical. But it is worthy of note that both Home and Cheyne were perfectly acquainted with the fact that the disease which they described was liable to be confounded with one which affected the larynx secondarily, having its original seat in the fauces. One of these writers, quoting Dr. Starr's account of the "*morbus strangulatorius*" in Cornwall (which was epidemic diphtheria in its most typical form), says that that complaint "appears more nearly allied to the malignant sore throat, although it sometimes attacked the trachea." And the other commences his chapter on diagnosis by remarking that he had seen several children whom he would have supposed to be suffering under the second stage of croup had he not discovered sloughs upon the tonsils and uvula. Bretonneau, however, showed that in some cases of diphtheria the affection was limited to the air

passages below the epiglottis. One case of this kind is recorded in his fourth memoir (Case 45). It is that of a child, aged one year, which was under the charge of a nurse living near Tours. Bretonneau himself points out that in this town there had not for many months been a single subject attacked with epidemic angina, with the exception of the patients admitted to the hospital. The disease was, however, prevailing at the hamlet of Chenusson eight French leagues to the north of Tours, and on inquiry the fact was elicited that the nurse was a native of Chenusson, and aunt to a boy who had died of diphtheria five or six days before the child was attacked. She declared that the fear of the contagion had hindered her from receiving any one who had been in communication with patients suffering from the disease; but (it is added) "in the very terms of her denial proof was found that she had been in communication with several of them." It is worthy of attention that the proof of the diphtheritic nature of this case was thus incomplete, although there can be little doubt about the matter. Bretonneau goes on to say that this was the second time, and in the proportion of one to thirty, that he had met after death with diphtheritic inflammation limited to the air-tubes. It is therefore evident that whatever may be the nature of membranous croup, it was at that time in France a rare disease.

Bretonneau's doctrine as to the diphtheritic nature of croup was in due course adopted by his pupil Trousseau, by Guersant, Barthez, and almost all the other leading French physicians. In England it was for a long time repudiated by every medical writer, but within the last few years it has met with a much more favorable reception. The late Dr. Hillier advocated it in 1862, and since then Dr. Johnson, Dr. Semple, and Sir. J. A. Cormack have maintained it, and Sir W. Jenner has withdrawn his previously expressed opinion that the two complaints are distinct.

In adopting the view that membranous croup is always a form of diphtheria, Bretonneau was, of course, obliged to draw a sharp line of distinction between that affection and all milder forms of laryngeal inflammation unattended with the formation of false membrane, and the same opinion has necessarily been maintained by all those who have since adopted the doctrine. Bretonneau's name for the non-membranous affection was "stridulous angina," it has also been called "stridulous laryngitis," "inflammatory croup," and "infantile laryngitis."

Now, it is important to note that the English writers of the last century were well acquainted with the fact that croup was liable to be mistaken for another affection which they designated "spasmodic" or "spurious" croup. We have not been able to discover who originally pointed out the peculiar characters of this disease, but they are fully set forth in a paper which Mr.

Field, Apothecary and Secretary to the Medical Society of London, read before that body in 1796. The most distinctive features are the suddenness of onset of the disease, the alarming nature of the symptoms from the very commencement, and its tendency to return again and again in the same patient.

Now Cheyne, in the second edition of his work, discusses at considerable length the relation between the disease of Home, and this "spurious" or "spasmodic" affection, with which he was acquainted though the writings of Field, and of Ferrier, a physician of Manchester, who had published an essay on the subject in 1810, and he comes to the conclusion that there are no just grounds for admitting two kinds of croup. The affection in question occurs, he says, "in those families which are subject to genuine croup; it arises from the same exciting cause (exposure to cold); it prevails during the warm weather."

On referring to the cases of which Dr. Cheyne records the details, it appears that all those among them which terminated in recovery presented more or less clearly the characters of the "spurious" affection. The comparative harmlessness of this form of croup has since been pointed out by other writers.

APPENDIX III.

HISTORICAL SKETCH OF ANATOMICAL DISTINCTIONS WHICH HAVE BEEN DRAWN BETWEEN CROUP AND DIPHTHERIA.

The history of the terms Croup and Diphtheria, and of the conceptions connected with them, has been so different in Germany and England, that they will most conveniently be treated of quite separately.

History of the Anatomy of Diphtheria in England.

Whenever an anatomical distinction between croup and diphtheria has been drawn in this country, it has always started with the assumption that the croupous membrane is a simple fibrinous exudation, and with this the diphtheritic membrane has been compared, and it has been sought to establish a difference in two respects—(1) in the presence of some parasitic vegetable growth; (2) in the diphtheritic membrane being composed of cells without fibrine.

1. *Vegetable growth.*—Laycock, in a lecture at Edinburgh, May 29th, 1858, regarded diphtheria as the product of a fungus, viz. the oidium albicans. Hillier, on the other hand, pointed out that while the false membrane consisted chiefly of cells, *i.e.* mucous corpuscles and epithelial elements, with few fibres, a fungus might be found in some cases, but this was *Leptothrix buccalis*, not *oidium*, and of no pathological importance.

Other observers published cases in which no fungus elements were found, and the theory of parasitic infection was generally dropped in this country until recent years.

2. *Cellular structure.*—When cases of diphtheria began to be observed in this country during the great epidemics of 1855—59, &c., it seems to have been at first assumed that the minute cha-

racters of the diphtheritic false membrane were the same as those of the croupous, which had been always regarded as composed chiefly of fibrine. Some observations were however published, such as those of Dr. George Harley (' Path. Trans.,' xii, 241), to show that the diphtheritic membrane consisted of cells and not of fibrine.

An apparently similar but really different view has been held by Wagner in Germany, and confirmed by MM. Cornil et Ranvier (' Hist. Path.,' p. 89).

More recently Dr. Murchison published a case of diphtheria extending to the trachea and bronchi, in which he reiterated the account of the diphtheritic false membrane as composed of cells " everywhere made up of modified epithelial cells, and containing no fibrillated tissue." (' Path. Trans.,' xxii, p. 36)

Hillier (' Diseases of Children,' 1868) describes the false membrane of diphtheria as, when examined microscopically, being found to consist of altered epithelial cells, of granular corpuscles and nuclei. In the deeper layers pus globules and blood-disks are often seen. Fibrillation, such as occurs in fibrinous exudation, is sometimes seen on the under layers of the deposit.

Jenner (' Diphtheria,' 1861) describes the product upon both the pharynx and the larynx as " lymph," and speaks of it as varying much in consistence in different cases, sometimes as soft as cream, sometimes as resembling wash leather. The softer varieties consisting of free granular corpuscles and epithelium, the tougher of fibres such as are seen in the buffy coat of blood coagula.

He speaks of the lymph as often difficult to separate from the pharyngeal mucous membrane ; but in the larynx and trachea a distinct separable membraniform layer. The exudation may begin in the larynx, and spread downwards to the trachea and bronchi, without involving the pharynx.

In the pharynx, the inflammation is not limited to the mucous membrane, or even to it and the submucous tissue, for the deeper parts are thickened and toughened.

Vegetable growths have no doubt been occasionally seen in diphtheritic exudation, but being often absent, play no essential or important part in the cases of diphtheria seen by Jenner.

No anatomical distinction is given between croup and diphtheria, but warning is given against confounding diphtheritic exudation with the specific disease, diphtheria.

According to Greenhow (' On Diphtheria,' 1860) the exudation varies in consistency from a pultaceous or almost liquid exudation, to a firm, consistent and more or less elastic membrane. The elastic form of false membrane is not unlike the exudation poured out from an inflamed serous membrane. Sometimes the exudation is not membranous, but dry and granular. Examined under the microscope, it is found to consist of coagulated fibrine and epithe-

lium; the latter usually more abundant in the outer portion of membrane, while the deeper portion is more purely fibrinous. Exudation cells are often intermixed with the fibrillar tissue. Low forms of cryptogamic plants occasionally found, but not invariably, and also found on unhealthy mucous surfaces in other diseases. Greenhow, however, describes necrosis and sloughing as frequent pathological appearances of diphtheria, with or without the presence of false membranes.

Further observations on the anatomy of the false membrane in diphtheria, were made by Bristowe (1859), Sanderson (1859), Harley and others. The two former found fibrine to be an element in the false membranes. The existence of this constituent was denied by Harley and others. No comparative observations appear to have been made in cases of undoubted croup.

Squire, in 'Reynolds' System' (vol. i, p. 259 and p. 397), in 1866, speaks of the croupous membrane as different from that of diphtheria "both in its chemical and physiological relations. It is not simply fibrine, but consists of effused lymph, in which the presence of albumen can always be chemically demonstrated. Microscopically it is a mass of cystoid corpuscles." Also it is not the result of interstitial change in the mucous membrane, but is an exudation. Other observers appear not to have traced the chemical distinction, or have thought it unimportant; and most would repudiate the notion that the diphtheritic membrane is exclusively or specially fibrinous.

None of these observers seem to have drawn any general distinction between laryngeal or tracheal products on the one hand, and pharyngeal or faucial on the other; but unless this distinction be kept in mind, the distinction of croupous and diphtheritic products becomes ambiguous or impossible.

It is to be noted, in comparing observations quoted above with later observations, that at that time, the modern method of making vertical sections through the mucous membrane and the false membrane together does not appear to have been practised.

It is further to be observed that few, if any, comparative observations can be found to have been made on products of croup and diphtheria at the same time, and with the same methods of investigation. In every case the reference has been to an assumed standard or traditional definition of croup. Thus, while several peculiarities have been pointed out in which diphtheritic products differ from croupous products as thus understood, it is probable or almost certain that the same peculiarities would be found in morbid products which have always been regarded as indisputably croupous if examined by modern methods of research.

Various observations on the presence of fungi or bacteria in diphtheria have been of late years published, but need not be

considered here, as they are avowedly either confirmations or refutations of the views of German observers; and no direct comparative investigation has been made of the products of croup.

The testimony of English observers does not seem to supply any anatomical basis for the separation of diphtheritic from croupous products. English pathologists do not appear to have adopted the solution which has been accepted by the Germans, of making croup an anatomical term, applicable even (among other things) to certain products of diphtheria.

History of the Anatomy of Diphtheria in Germany.

The history of this subject in Germany naturally divides itself into three periods:

I. The history of the views prevalent before the advent of the cellular pathology, or at the time of its introduction.

II. These views as modified by the researches of Buhl and Wagner on the activities and changes of cells in croup and diphtheria.

III. Recent researches relating to the presence of vegetable growths in diphtheria.

I. The views prevalent in Germany on the anatomy of croup and diphtheria twenty years ago were expressed in the text-books of Rokitansky and Förster, but had already been influenced by Virchow.

Croup was regarded as a "fibrinous exudation" effused in a liquid form and coagulating on the surface of the mucous membrane, this being unaltered or nearly so. The false membranes might contain fungus-growth, but this only the ordinary *leptothrix*.

Diphtheria, on the other hand, was described by Rokitansky as essentially a necrotic process, consisting in infiltration of the mucous membrane, accompanied by exudation, and followed by sloughing; a membranous necrotic mass being formed which may be confounded with a croupous membrane. Rokitansky regarded this process as identical with that giving rise to "Aphthæ" in the mouth, and on various parts of the intestinal canal. Vegetable parasites are sometimes present, but have no importance. He does not clearly describe any such necrotic affection of the trachea, except as a part of some general disease, as typhus or tuberculosis. It would appear that most, if not all, the false membranes occurring in the air-passages must come under Rokitansky's definition of croup.

Virchow's views on this subject appear to have been several

times modified, but it seems to have been in great part owing to his influence that the names croup and diphtheria received so wide an extension of meaning as they have had, and now have, in German medical literature. The term croup was applied to all inflammations accompanied by fibrinous exudation on a surface, hence lobar pneumonia became croupous pneumonia; and kidney disease with hyaline ("fibrinous") cylinders in the tubes was called croupous nephritis (though this last explanation was afterwards repudiated by Virchow himself). Again, any necrotic or sloughing process was called diphtheritic, and ordinary dysentery became intestinal diphtheria. Thus, to a German medical reader the names croup and diphtheria convey the ideas, not of laryngeal or pharyngeal disease, but of processes. A correct appreciation of this signification is necessary to understanding the German views on the subject.

Virchow, in 1865, also laid weight on the element of necrosis or sloughing, as essential to diphtheria distinguished from croup, but somewhat extended the views given above.

II. Wagner in his paper published in 'Archiv der Heilkunde,' 1866, p. 481, represents the prevalent views of most pathological anatomists and nearly all clinical physicians as consisting in regarding the pharyngeal diphtheritis and croup of the air-passages as perfect examples of diphtheritic and croupous exudation respectively, being generally regarded as varieties of the so-called fibrinous exudation, differing only in this respect, that the croupous exudation lies on the free surface of the mucous membrane and leaves its tissues unaffected, while the diphtheritic is situated partly on the surface, partly, and more especially, within the parenchyma of the mucous membrane, and causes necrosis of it. The views here stated had, he remarks, been in recent years modified by Virchow, Buhl, and Weber, though these authors were not in agreement with one another.

At starting Wagner takes as the provisional definition of diphtheritis, an affection of the mucous membranes, in which the surface is covered with the well-known grey false-membrane, for the most part adherent to the surface, and under which the mucous membrane itself is more or less infiltrated and thickened. Croup, on the other hand, is provisionally defined as meaning those affections in which the well-known membrane is present but lies loosely upon the mucous surface, and under which the mucous membrane itself is either normal to the naked eye or, at most, hyperæmic.

Wagner further remarks that in the very numerous fatal cases examined by him of simultaneous pharyngeal diphtheria and croup of the air-passages, he found in the back of the mouth as well as in the pharynx the unmistakable characters of diphtheria; in the lower part of the larynx, the trachea, and often also in the bronchi, those of croup; while the upper part of the

larynx sometimes presented an intermediate character, sometimes one more distinctly diphtheritic.

Wagner describes separately:

I. Diphtheria of soft palate and pharynx.

II. Croup of lower larynx and trachea.

I. In the diphtheritic deposit or false membrane, Wagner describes a delicate network of which the fibres were sometimes so delicate as to resemble those of coagulated fibrine, but much more commonly composed of bands of very unequal thickness, generally much broader than threads of coagulated fibrine. Both the thinner and thicker reticulations may be found in the same place, but generally pharyngeal diphtheria showed the thicker; in laryngeal and tracheal diphtheria the finer network preponderates. Transitional forms between the two were found. This network, whether of the finer or the coarser variety, Wagner believed to be never composed of coagulated fibrine, but to be produced by a peculiar metamorphosis of the epithelial cells, which undergo degeneration, and then become partially absorbed so as to produce the appearance of a fibrinous network. The process is compared to that previously described by Buhl (in 1863) as giving rise to the production of croupous membranes. Beside the network-cells of lymphatic type, leucocytes were very generally though not universally present, and were very irregularly distributed. The further details need not concern us here, except as compared with the description given by the same writer of the croupous membrane. In diphtheria properly so called there is, moreover, according to Wagner, constantly an infiltration of the mucous membrane with newly formed cells and nuclei, sometimes amounting to purulent infiltration, and this extends into the submucous tissue; sometimes deeper still into intermuscular connective tissue.

II. The croupous membrane, according to Wagner, as seen in the lower part of larynx and trachea, consists of a close network of delicate threads, enclosing a large number of elements resembling pus corpuscles, the latter being very much more numerous than in the diphtheritic membrane. The origin of this network is, according to Wagner, like that found in diphtheria, from metamorphosis of cells. The mucous membrane itself shows less change, being merely hyperæmic and infiltrated with cells, but chiefly in the upper layers; the lower strata and the submucous tissue being free. The same description applies to the false membranes met with in the bronchial tubes, the only difference being that in the latter cellular structure predominates, and the membranous affection may gradually pass into a simple purulent or mucous bronchitis. Even the small casts "so called fibrinous" found in the smallest bronchial tubes in cases of ordinary lobar pneumonia exhibit the usual structure of croupous membrane.

The above explanation was still further extended by Wagner to so called croupous pneumonia itself. The fibrinous network which fills the alveoli in this disease was explained as derived, almost without a doubt, from the metamorphosis of cells. It was said to show the same variations as the pseudo-fibrinous network of croup or diphtheria, and the pus-corpuscles form in pneumonia as in the disease just mentioned, a considerable proportion of the infiltrated mass.

Finally Wagner describes numerous transitional forms between croupous and diphtheritic membranes, and lays stress upon the fact that both appearances are frequently met with in the same case, at different parts of the respiratory or faucial mucous membrane. A case is called one of pure *croup* where the false membrane lies upon the surface, with little affection of the mucous membrane itself, and, at all events, no purulent infiltration of it, and where the pseudo fibrinous network is composed of fine threads. Pure croup may occur on the tonsils and fauces only, as well as in the air passages, or on both, simultaneously or successively.

The diphtheritic condition was rare in the air-passages and only in a single case found there alone. Other pathologists who in general adopt Wagner's explanation do not recognise the possibility of croupous disease of the pharynx and tonsils, and regard a diphtheritic condition of the air-passages as of the rarest occurrence.

From the above it is clear that Wagner makes no pretension to draw an anatomical distinction between the disease croup and the disease diphtheria. On the contrary, he expressly repudiates any such distinction. The distinction which he draws is between two anatomical conditions merely, without referring to their clinical accompaniments ; and even this, as he clearly points out, is a difference of degree. It seems to have been often supposed that if the diphtheritic membrane could be shown to be non-fibrinous, but derived from cells, altered or unaltered, this would of itself distinguish it from the croupous membrane, which has been assumed to be fibrinous. But this opinion, whether correct or not, finds no countenance from the views of those who claim to have shewn the non-fibrinous character of the network found in diphtheritic membranes, since their explanation applies equally to the similar appearance in the croupous membrane.

Buhl, in 1863, promulgated a theory of the nature of croup which should be mentioned, as it has had considerable influence in Germany. He rejected the ordinary *primâ facie* view that fibrine is exuded from the vessels, but spoke of it as formed by a process of secretion within the epithelial cells, which, at the same time produced pus-corpuscles by a process of endogenous proliferation. The same explanation was extended to the production of fibrine within the air-cells in pneumonia, and even to the inflammations of serous surfaces, in which Buhl refused to see

simple exudation of coagulable material, but referred the production of inflammatory lymph to the action of cells. These views do not appear to meet with much acceptance at the present day, especially as regards the identification of croupous membranes with ordinary inflammatory lymph of serous inflammations, but they have had considerable influence on the development of the theory of croup and diphtheria. Buhl, ('Zeitschrift für Biologie,' 1867, Band III, S. 367) has attempted to draw a clear histological distinction between croup and diphtheria. He rejects, in the first place, the possibility of a croup of the pharynx, and holds that the question can only arise in case of disease of the air-passages. In croup there is an actual deposit on the surface of the epithelium, consisting of pus cells and a fibrinous cement, which is separated from the mucous membrane by the unbroken epithelium. In diphtheria there is no deposit or new production properly so called. What appears to be such is only a layer of altered epithelium, or of necrotic mucous membrane. The essential difference consists in the condition of the mucous membrane which is, in diphtheria, infiltrated with a new cellular or nuclear growth. There may be, in croup, some infiltration with ordinary pus cells, and they may even be numerous; but there is not that nuclear proliferation seen in diphtheria; moreover, the cellular infiltration is not the important thing in croup, and may be quite absent; while in diphtheria it is never wanting. It is this rapid and abundant infiltration, which, by compressing the blood-vessels, causes local anæmia and necrosis which is characteristic of diphtheria.

Buhl admits that croup and diphtheria may be, and frequently are, simultaneously present, the former in the air-passages, the latter in the pharynx, though more often the affection of the air-passages in such cases is diphtheritic and not croupous. But there is no reason why the diphtheritic infection, like other such infections, should not produce even pure croup of the air-passages.

These views of Buhl's clearly do not distinguish croup and diphtheria as *diseases* by any anatomical (or histological) criterion. With the other points of distinction which he insists upon, we are not now concerned.

It is also noticeable that he appears, in his paper, to have abandoned his former elaborate explanation of the origin of croupous material in the air-passages, lungs, and elsewhere, hence he no longer speaks of the croupous membrane as formed out of cells.

The above extracts represent the state of opinion in Germany, on the histology of croup and diphtheria before the rise of the modern fungous theory of diphtheria, which has thrown other alleged points of difference into the shade.

III. *Third period.*—The literature relating to the alleged existence of vegetable parasites in diphtheria is very voluminous,

and can be here considered solely in relation to the question of the anatomical distinctions of the disease from croup.

Buhl, in 1867, was one of the first who drew attention to the presence of parasitic elements in the diphtheritic slough or false membrane, so small that they had been mistaken for granular fibrine. He leaves it undecided whether the parasite was peculiar to diphtheria, or merely the ordinary *Leptothrix bucilis;* and finally, whether if a peculiar form, it is of any importance in the causation of the disease.

The question was afterwards investigated by very numerous observers, of whom Nassiloff ('Virch. Arch.,' L) and Oertel ('Bayr. Intelligenz Blatt,' 1868, and 'Jahresbericht der Med. Wissenschaften,' 1868, II, 116) described micrococci as occurring in the diphtheritic masses, and traced them into other organs, as well as in the blood. The disease has also been inoculated into animals.

It is to be observed that in Germany, as in England, these observations first related to the ordinary forms of fungi such as are very commonly or normally found in the mouth, and it was soon recognised, that such growths if present, could be of little importance. Afterwards, the more minute forms of *micrococci* or spheroidal bacteria were recognised, which were thought to be of great importance, and with respect to which the only doubt would be whether they were really distinct from the bacteria found in putrifying animal substances generally.

Letzerich differs from other observers in recognising a true fungus with mycelium and spores of the *Hyphomycetes* family as the cause of diphtheria. His views have not been generally accepted, and are important only in the present connection as showing how the assumption of a fungus growth bears upon the explanation of croup.

Letzerich ('Virch. Arch.,' vol. liii, 1871, p. 498, "Beiträge zur Physiologie der Flimmerzellen;" "Ueber Exsudat und Eiterbildung," and 'Die Diphtherie,' Berlin, 1872) holds that in diphtheritis the cause of the affection of the mucous membrane is a fungus which penetrates from without, either destroying the epithelial cells or hollowing them out in large scales, and by penetrating inwards into the tissue of the mucous membrane produces the diphtheritic exudation. Thus it happens that the exudation differs macroscopically and microscopically according to the situation of the diphtheritic affection. On those mucous membranes which are covered with a smooth, stratified epithelium (as mouth, nose, pharynx, vagina), the exudation is, generally speaking, firm and tough. The irregularly distributed exudation-mass is mingled with epithelial cells and pus cells. Where the diphtheritic exudation is closely connected with the mucous membrane, there are found enormous masses of articulated and branched thallus-threads.

"On those mucous membranes which are covered with cylindrical or ciliated epithelium (larynx, upper part of trachea, intestine), the diphtheritic exudation has a softer and more creamy consistency, so that it can be easily stripped off with the back of a knife or with forceps. The epithelial cells are completely consumed, and portions of the exudation appear under the microscope as masses of detritus pierced with fungus filaments.

"Diphtheria and croup may very often coexist and pass the one into the other without being identical.

"Croup may be produced by the inflammatory stimulus supplied by the diphtheritic affection, but may be also a distinct disease existing simultaneously and independently." Letzerich has often observed the fact that the diphtheritic fungus when widely distributed in the tissues (of the larynx) caused an inflammation of connective tissue, which, when propagated to the trachea, produced croup. Post-mortem examination of laryngeal diphtheria in children have often shown croup and diphtheria present simultaneously."

With respect to the parasitic distinction between croup and diphtheria, it is to be noted:

1. That usually these fungi have been found only in cases of undoubted diphtheria, and their distribution through the organism has been thought to explain the constitutional character of the disease.

2. That nevertheless, in some cases (according to Wagner), primary laryngeal croup has been found to be accompanied by such organisms.

It would appear then premature to take the presence of fungi, even if they are assumed to be the cause of the disease, as a sufficient mark of difference between croup and diphtheria.

Summary.—1. It would seem then that the experience of German pathologists supplies no certain anatomical distinction between the two diseases; but, by taking croup as a purely anatomical term, a sufficiently precise meaning can be given to it. In this sense croup is very frequently an accompaniment of, or more strictly, one of the manifestations of the disease diphtheria.

2. In this sense croup is very nearly always, if not invariably, confined to the air-passages, and one of the highest authorities, Rindfleisch, in his last edition ('Pathologische Gewebelehre,' p. 307, 5th edit., 1878), clearly shows that the anatomical distinction between croup and diphtheria in the older (German) sense of the words, "obviously depends upon the anatomy of the parts affected." In other words, the croupous process belongs to the air-passages, the diphtheritic to the pharynx and fauces, whatever their causes respectively may be.

3. The presence or absence of vegetable growth cannot be

taken as a distinction between croup and diphtheria, till there are a larger number of negative observations showing the absence of this growth in cases having the clinical characters of croup.

4. Croup, if it exists as a distinct disease, must be defined both by exhibiting the anatomical characters of croup only, without those of diphtheria (infiltration, necrosis, micrococci ?) and further by clinical characters, with which here we are not concerned.

APPENDIX IV.

REPORT ON THE HISTOLOGY OF THE LARYNGEAL AND TRACHEAL FALSE MEMBRANE.

In reporting upon the microscopic examination of the larynx and trachea in cases of membranous exudation in that position we have to regret that the means at our disposal have been very limited, and that, therefore, no decisive result can be expected.

We had hoped to have been able to examine the condition of the air passages, and to have compared the false membrane and the subjacent tissues in various forms.

The conditions which we desired to examine were as follows:

1. Membranous exudation resulting from mechanical, chemical, or physical irritants—boiling water—some cases of which have been recorded, and of which one of us has seen an instance.

2. Membranous exudation limited to the larynx, in which the surroundings, the absence of probable contagion, the history of onset, symptoms during life, and post-mortem appearances, should have excluded, as far as might be, the possibility of contagion.

3. Cases of undoubted diphtheria with laryngo-tracheal exudation, both with and without false membrane in the pharynx, &c.

4. Membranous exudation in the larynx occurring in the course of fever, septicæmia, and the like.

We regret that we have not met with the help we anticipated and hoped to receive in the matter, and that, with two or three exceptions, we have not received any such specimens for examination in spite of repeated requests. We have, therefore, been obliged to rely solely upon the cases which have fallen under our own observation, and as these have been taken from hospital practice it has not been possible thoroughly to exclude diphtheritic contagion. The only exceptions are a specimen kindly forwarded by Dr. Wm. Squire, of which the particulars of the clinical history have been published in the 'Trans. Path. Soc.,' vol. xxvii, and two specimens of the larynx, &c., from cases of membranous exudation following measles, which were under the care of Dr. Dickinson. We have, however, examined specimens

from a number of cases of "diphtheria" and "croup" occurring in hospital practice. In some of these there was distinct evidence of contagion of diphtheria; in others this could not be ascertained. In two of the cases of membranous exudation in the fauces and larynx no source of contagion could be discovered, and there were strong grounds for a belief that they originated in one case from insanitary ward conditions, in the other from the patient's own condition, both being in patients who had been in the hospital for some considerable time. But having in view the many possibilities of importation of contagion from without existing in every large hospital we cannot speak positively on the subject. Three of the cases from which specimens were taken conformed clinically to the type of "croup," and there was no discoverable source of contagion. The only cases which we have been able to examine of false membrane occurring in specific fevers and blood-poisoning are four: one case of typhoid fever in which the false membrane precisely corresponded with that seen in diphtheria, the other a case of septicæmia in which a thin pellicular exudation was found in the larynx only, and two cases following measles. It is clear that any examination of these specimens could not solve the question of the distinction of "croup" and "diphtheria," for we have failed to obtain any specimen from a case to which we could certainly give the former name in its commonly accepted signification; but we believe that the record of the examination may throw some light upon the questions at issue, for the following reasons:

Whatever may be the etiology of the cases in which there is laryngeal membranous exudation only, the result of our observation is to lead to a belief that such exudation may occur under conditions which negative the probability of the presence of contagion. The similarity of the appearance, relations and mode of formation of the false membrane under the various conditions in which it is found, lead to the belief that if "diphtheria" is a distinct and well-defined specific disease the power of production of false membrane in the larynx and trachea is not peculiar to it, but that its poison shares the power of giving rise to it with other poisons and irritants, and that its distinctive characters must be sought, not in the presence of false membrane, but either in some peculiar characters of the membrane, or in other and independent conditions. In fact, it appears to us that the formation of false membrane in the larynx and trachea is merely a mode of reaction of the mucous membrane which may be set up by a variety of conditions.

In the examination of the larynx and trachea with the false membrane we have endeavoured to determine the following points:

Are there any distinctions in the mode of formation of the false membrane and its general characters, and in its relations

to the subjacent tissues, such as have been stated to exist and to be distinctive of "diphtheria" and "croup?"

Does the false membrane contain any "specific" elements, &c., such as bacteria, fungoid growths, and the like, in any cases, and do the cases in which such elements are found coincide with any special class of symptoms or special etiology?

In the decision of these questions we have kept in view the changes—1, in the membrane itself; 2, in the mucous and submucous tissues; and 3, in the deeper parts and surrounding structures.

We have examined the parts in the fresh condition by means of teasing and with various reagents, and also sections made after hardening in absolute alcohol, in methylated spirit, and in Müller's fluid, and stained with various reagents or unstained.

We give only a brief summary of the results which we have obtained, believing that a minute description of all the appearances, apart from drawings, would be unintelligible and valueless, and that a minute description of each case would equally be out of place.

False membrane.—When examined in a fresh condition by means of dilaceration in water or glycerine this appears to consist mainly of altered cells, many of which in size and shape resembled ordinary pus-corpuscles, others of more angular shape and larger size, and yet others large, granular, with two or three nuclei, and some scarcely altered columnar epithelial cells, with others more or less swollen and granular. Together with this some fibrils and a good deal of granular matter were observed. In one case groups of minute granules resembling micrococci were seen, but in others there was no such appearance. It should be added that in only some of the cases was the membrane examined in this way.

By sections made through the membrane *in sitû* with the subjacent structures, either fresh or after various processes of hardening and staining, &c.

By this method of examination certain differences were observed in different cases, and in different parts from the same case. The false membrane formed a pretty continuous layer, usually closely adherent to the subjacent tissues or only separated here and there, and at its margin terminating abruptly. The false membrane, as examined with a low power (one inch), appeared in some cases to be composed of two layers, not separate, but marked by a somewhat wavy line, which was somewhat darker than the rest when stained, and seemed to indicate a transition in the structure, but not a separation. Where these two layers existed they will be spoken of as superficial and deep respectively. The condition of the free surface varied. In some specimens it was well defined and abrupt, but usually it was covered by an irregular layer of altered cells, with some

nearly unaltered epithelial cells, embedded in a granular matrix. This layer passed insensibly into the subjacent membrane.

The "superficial" layers of the membrane appeared for the most part to consist of a sort of coralline structure, irregularly stratified, the strata lying more or less parallel to the surface, the structure appearing under some conditions to be formed by a network with thick meshes and small apertures pretty regularly disposed through it. This network consisted of an apparently homogeneous, highly refractile substance, in which no trace of fibrillation could be seen. In the spaces were usually seen one or two nuclei. But in staining with various reagents and mounting in different ways this appearance was found to be a deceptive one, and it could be clearly seen that the apparent network was made up of cells, fused together at their edges, and having undergone such changes that the nuclei and centres of the cells were readily removed, leaving the marginal portions adherent. The transitional stages of this condition could be readily seen by comparison of sections prepared in various ways. Here and there the bands of the homogeneous network thus formed were thicker and more distinct.

The "*deeper*" layer, where distinctly present, appeared to consist of a more irregularly arranged network, composed of irregularly interlacing fibrillæ. At its superficial part it passed almost insensibly into the superficial layer, the coralline structure becoming replaced by irregular fibrils, the transition zone being seen best with a low power. Examined with the higher power, this deeper layer was found to be composed almost entirely of an irregularly interlacing network resembling coagulated fibrin, with some leucocytes embedded in its meshes.

In some parts the fibrous bands passed into the gland ducts for some distance, but not constantly.

The connection of the false membrane with the mucous membrane varied in different parts. In some cases a portion of the epithelium remained beneath the false membrane, which lay upon it; this especially when only the homogenous network was present. In other cases the basement membrane only persisted, and to this the fibrillated exudation closely adhered, or was separated at points corresponding apparently with the ducts of glands, the space being filled with fluid containing some altered epithelial cells. Only in some parts, here and there, did the superficial layers of the mucous membrane appear distinctly destroyed, the false membrane penetrating more deeply, and this in no case where the membrane could be readily detached as a pellicle.

The thickness of the deeper fibrinous layers varied in different cases and in different parts of the same larynx, in some being scarcely perceptible.

The deeper structures of the mucous and submucous tissues

presented various degrees of ordinary inflammation, the vessels being distended and filled with blood, and their walls and the surrounding tissue more or less infiltrated with leucocytes This condition was either limited to the mucous membrane itself, or extended deeply through all the tissues, and in some cases involved the whole of the tissues around (*e. g.* muscles of larynx, &c.). The thickness of the deeper layers of the false membrane and the extension into the gland ducts appeared to be in proportion to the intensity of the inflammation.

The mucous racemose glands in some cases showed but little alteration, or only a slight degree of catarrhal change, but in others they were filled with exudation and catarrhal products, and processes of fibrinous exudation extended into them.

So far, then, we have described the general appearances in all the cases, some in a greater or less degree. We must now define and limit the application to sets of cases.

In all the cases of true diphtheria where the larynx was affected, or where a clear history of contagion was present, and the larynx and trachea were alone affected, the inflammatory changes were very marked in proportion to the amount of exudation, with two exceptions, in which the exudation was very abundant on the posterior nares, fauces, and soft palate, but only commencing in the larynx. But even in these cases the deeper structures (*i.e.* away from the mucous membrane) showed traces of a very intense inflammatory process. The same must be said of one case in which the contagion was doubtful, but the pharyngeal affection was extensive. In these cases the deeper fibrinous exudation was very pronounced and firmly adherent, penetrating into the mucous glands, and the inflammation of the mucous and submucous tissues disproportionately intense.

On the other hand, in the cases in which the laryngeal exudation was the main factor, the lymphatic glands free from enlargement, and the case clinically conformable to "croup," the fibrinous part of the exudation was relatively slight, and the submucous inflammation much less intense or almost absent.

In two cases we were able to study the mode of formation of the false membrane in its early stages. The process appeared to begin as one of multiplication and heaping up of the epithelial cells at certain points, the regular arrangement of columnar cells being replaced by a mass of cells of smaller size and irregularly arranged, this appearing to be the first step in the morbid process.

From a comparative study of cases it would appear that the more superficial layers are formed by a change in the epithelium, consisting in proliferation, adhesion of the cells, either by a change in their substance or by mere exudation between them, and an alteration in the central portion of the cell, the change being very much like that seen in the growth of some vegetable tissues.

After a continuance of this process for a certain time ordinary fibrinous exudation ("coagulable lymph," liquor sanguinis, and leucocytes) appears to be poured out on the surface of the membrane, and, coagulating, becomes adherent to the superficial layers on the one hand, and the basement membrane on the other, and entering into and filling up the ducts of the mucous glands. (That it is *not* exuded from the mucous glands would seem certain, for the epithelium is often unaltered, and the fibrinous plug only penetrates a certain distance.)

When the false membrane is separating it would seem that this is effected either by secretion from the mucous gland raising it up, or by breaking down of the false membrane itself.

An explanation of this change which may be suggested is that the fibrinous exudation does not occur until the epithelium has been more or less detached, leaving only the basement membrane with dilated vessels beneath it, the state being that seen when the epithelium or epidermis is just peeled off (as may be seen in abrasions of the cuticle), an exudation of plastic lymph then occurring.

We have, however, as stated above, seen the epithelium persisting in patches beneath the false membranes (and M. Charcot has recently described a similar appearance).

Special conditions.—The presence of fungi and bacteria or micrococci has been so frequently described as a constant factor in diphtheria that some importance may be attached to the question of their discovery. Our opportunities of observation on this point have been limited, for we exclude from consideration such cases as were only examined some time after death, and in hot weather, or when decomposition had clearly set in; and we should attach but little importance to discovery of micrococci under such conditions. But it may be a fact of importance that in some cases even under such favorable conditions for their development, and in cases of undoubted diphtheria, we have failed to find either micrococci or fungus, except on the exposed surface of the false membrane.

In only one case (viz. a case where contagion was doubtful) have we found undoubted evidence of the presence of the minute ovoid or rounded bodies described by Oertel and others as the peculiar element of diphtheria. In that case we found clusters of micrococci both in the false membrane, in the mucous and submucous tissues, and in the lymphatic spaces of the connective and intermuscular planes, deeply in the substance of the larynx. It must be understood that this statement refers solely to the respiratory tract, not to the pharynx or nares, in which the presence of such minute granules, and even of filamentous network, simulating, if not really such, mycelium, are much more frequently found.

We are unable, therefore, to draw any conclusion from this

point. Of the condition of the pharynx, &c., we have said nothing, as it scarcely belongs to the part of the subject which we have been specially investigating. But we may state that one of us has found in three cases of diphtheria where there was some exudation in the pharynx, a very marked and peculiar swelling of the solitary follicles in the sub-mucous tissue, in some cases quite disproportionate to the amount of exudation, and, so far as could be judged, in some cases preceding the local exudation. These glands become greatly swollen, the elements multiplying or being infiltrated with leucocytes, and rapidly forming a homogeneous granular mass by degeneration of the inflammatory products. In the same way we have found the lymphatic glands of the neck intensely inflamed, with small spots of suppuration in them, and occasionally small hæmorrhages in and around them. But we have not entered here into the study of the changes in the pharynx, &c., which occur in diphtheria, as they appear to be specially excluded by the terms of the problem before us.

The state of the *lymphatic glands* of the neck. Our opportunities for the examination of these were so few that we prefer not to make any decided statement as to their condition.

(In conclusion, we may refer to the observations made twenty years ago by Dr. Bristowe, see 'Path. Trans.,' vol. x, p. 321, and to the description given by Wagner ('Gen. Pathology,' p. 264, et seq.), with which our own observations closely correspond.)

NOTE.—The following case has been communicated to the Committee since the completion of their report, but it has been thought of so great importance that they have appended it, together with a report on the microscopic structure of the cast by the members of the Committee entrusted with that branch of the inquiry. They desire to acknowledge their obligations to Dr. Whitehead Reid for his ready permission to examine the specimen, and to Mr. T. D. Acland, B.A., who has kindly prepared the sections.

A CASE OF MEMBRANOUS LARYNGITIS FROM EAU DE COLOGNE.

Mrs. W. V. L—, æt. 27 years, having her usual health, received, during a faint from pain at stool, some eau de Cologne into her trachea by way of the left nostril, her head being at the time in a dependent position. Burning and pain were at once experienced in the nostrils, throat, larynx, eyes, and ears, breathing and deglutition became difficult and painful, the fauces and conjunc-

tivæ red, swollen, and congested, and the voice a mere whisper; there was a hoarse, constant cough. Suddenly, within an hour, the extreme dryness of parts changed to profuse watery discharge from eyes, nose, and mouth, producing great relief to the previous strangling sensations. There was no fever, but a burning feeling in the ears and intense conjunctivitis, a constant desire to swallow, wheezy respiration and loose cough, with mucous expectoration. Several spasmodic exacerbations of dyspnœa occurred during the day. Pulse 100 to 120.

During second day, which was her worst, the cough became more incessant and "croupy" in character. Deglutition became so extremely painful that nutrient enemata was resorted to. The respiratory murmur became feeble, there were loud mucous râles in the trachea, and symptoms of defective oxygenation. By the evening she was greatly depressed. Pulse 130, feeble; cough incessant; great dyspnœa and orthopnœa; rhonchus in both lungs. Two superficial abrasions, with irregular edges and raw surfaces, were noticed on the upper part of the pharynx. There were no other excoriations nor ulcers seen in the mouth. Propped up in bed a very restless night was passed, the breathing being stridulous throughout.

On the third morning the ulcers were covered with membrane; a little bright blood was coughed up, followed by a piece of soft elastic membrane. The cough was constant and "brassy;" expectoration thick, white, and tenacious, and sank to the bottom of water; voice aphonic; breathing audible beyond the room; respirations shallow and rapid. Examination of the chest proved the left bronchus to be most obstructed. Skin was moist; temperature 99·4°; bowels loose; pulse 100, feeble. She had no sense of taste nor smell, but was not deaf. There was photophobia, lachrymation, and congestion of the lower palpebral conjunctiva. Tongue moist, furred white, with prominent papillæ and red edges. A thin, glairy, and irritating secretion ran from the nose; the edges of the alæ internally were excoriated and swollen, more especially in the left nostril. Pillars of fauces were dusky; tonsils scarcely apparent and not affected; back of pharynx was bright red, and a thick, yellowish pellet was hanging down behind the soft palate to the right side, covering the site of the two ulcers. Soft palate was congested and uvula somewhat elongated. The whole upper part of the pharynx was inflamed. The epiglottis scarlet, a few vessels apparent on it. There was some œdema of the glottis, especially of the mucous membrane about the arytenoids, which was thickened, and of the aryepiglottic folds and ventricular bands; it was difficult to recognise the vocal cords, they were congested posteriorly at least, and some tenacious secretion occupied the glottis. The laryngoscopic examination was ill-borne and rhinoscopy found impossible. There were no enlarged glands.

On the fourth day the cough was more urgent, with a constant desire to expel something; the œdema of the glottis was greatly reduced by treatment, and a small piece of membrane was again brought up in the evening.

The cough became more violent during the night, and on the fifth day, at 4 a.m. (92 hours from the accident), a perfect "cast" of the larynx, trachea, and upper part of the left bronchus was expelled entire, in one piece, with immediate and great relief, her voice returning at once. The "cast" measured six inches in length, and (after having been exposed for eleven hours on a handkerchief in a hot room) would admit an ordinary cedar pencil down its lumen. It was yellowish-white in colour, very thick, soft, elastic, and full of moisture. The impressions of the cricoid cartilage and ten rings of the trachea could be distinctly counted upon its surface; its upper extremity was frayed out, and its lower filiform, though hollow. It was stained with bright blood at its upper part, at the filiform extremity, and midway between these points. A little bright blood was brought up after the expulsion of the cast. In the evening her pulse was 88, fuller, and temperature 97·4°.

The œdema of the glottis had now quite disappeared. The larynx remained tender for six more days; the vocal cords were dull and congested, but never ulcerated; they did not regain their lustre till after the twelfth day.

Small pieces of membrane were coughed up to the end of the seventh day, on which day there was some slight return of taste, the tongue peeling in patches, leaving raw, red-looking place amid the white fur. The left tonsil also became painful, swollen and red on this seventh day, and there was slight glandular enlargement at the angle of the jaw then, but this quite passed off by the end of the ninth day. There was never any ulceration of, nor any patches on, the tonsil; the right one was not at all affected. The left Eustachian tube was found to be blocked at the time the tonsil was inflamed, but air entered the right tube freely. The left ear was also painful on swallowing and yawning, and both nostrils were impervious at this time. Small patches of membrane remained in the left nostril up to the seventh evening. The nostrils remained blocked till after the ninth day. The mucous membrane of the nose had returned to its natural state by the eleventh day. Lactic acid and lime-water visibly dissolved the patches of membrane in the left nostril.

From the fifth to the twelfth day the patient suffered from indigestion and constipation, and passed mucous shreds in abundance when the bowels were made to act. The urine was very acid, loaded with amorphous lithates and epithelium (not renal); sp. gr. was 1036. It never contained albumen. The catamenia, which were due at this time, did not appear. By the thirteenth day some sense of smell returned.

The cough continued till after the fourteenth day; the eyes remained sensitive to light up to the twentieth day; a disagreeable odour at the back of her nose annoyed her also then.

In three weeks from the accident she could sing again. There were never any paralyses. Her recovery was perfect with the exception of some diminution of acuteness of her gustatory and olfactory sensations. Three months afterwards she said, "Things frequently smell and taste of Eau de Cologne." She was exposed to neither scarlatinal nor typhoid poisons either before or during her illness. There was no diphtheria in the village, and neither of her young children, who were constantly with her, became ill.

T. Whitehead Reid,
Surgeon to the Kent and Canterbury Hospital.

Report on the microscopic characters of the cast of trachea produced by Eau de Cologne.—Four sections were submitted for examination. They formed perfect casts of the interior of the trachea. All of them presented nearly the same characters. The outer layers present a lamellated appearance, studded with fine nuclei. These lamellæ are mostly in close contact with each other. More internally the texture of the cast becomes looser, and the lamellæ are separated by spaces from each other, the spaces containing a granular coagulum. Still more internally the lamellæ become again closely united. In parts, more especially towards the lumen of the tube (the internal layers), altered epithelial elements are visible, each cell preserving more or less its original cylinder form, and the whole forming in the cast a layer traceable for some distance, but never traceable completely round the tube. Nor does this epithelial layer abut anywhere directly upon the internal surface of the tube, being always separated from it by more or less granular coagulum, apparently formed by transudation from the cells before these were cast off themselves in the form of a definite membrane. The middle looser layers of the cast present many of the appearances of mucinous coagulum. Here and there the spaces contained between the lamellæ are of a circular or oval outline, and appear to represent, or to be casts of, gland tubes. In one or two, these spaces are lined with conical or triangular cells, which are evidently the altered epithelial linings of these ducts. Comparing the nuclear proliferation in the inner layers with that in the outer layers, we find that the nuclei are more abundant, more closely packed, and connected together by more definite intercellular tissue in the outer layers than in the inner.

From the above it would appear as if the cast had been produced in the following manner and in the following layers:—(1) A layer of muco-albuminous coagulum lying on the inner

surface of the cylindrical epithelium, and possibly produced by the direct action of the eau de Cologne on the epithelium. (2) A layer of altered cylindrical epithelial cells, arranged so as to resemble papillæ. The papillary arrangement must, however, be due to the normal epithelium being pushed off into the interior of the tube by the exudation of a considerable quantity of material on the side of its attached surface, and thus being thrown into plaits, which in section simulate the form of papillæ. This epithelial layer would appear to have been dislodged from its underlying basement membrane by—(3) A thick layer of muco-albumen, loosely coagulated in a lamelliform manner, containing scattered nuclei and enclosing spaces, which appear to be partly casts of ducts and partly mere intervals between the lamellæ of coagulated mucin. (4) The last layer is backed up externally by a more definite layer of nucleated albuminous tissue, which appears to result from the direct proliferation of the nuclei, &c., of the tracheal wall.

Comparing this cast with the diphtheritic membrane in the section of the larynx from one of Dr. Dickinson's cases following measles, and another of ordinary diphtheria, prepared by Dr. Greenfield, it is evident that the only part in the diphtheria sections strictly comparable to the above is the layer in the latter, numbered 4. We must, however, guard against concluding from this that there is never produced in diphtheria anything comparable to the layers 1, 2, and 3, because the one is a section of the larynx with membrane adhering to it, whereas the other is a mere section of a cast thrown off during life.

APPENDIX V.

ANALYSIS OF CASES OF LARYNGITIS WITHOUT EVIDENCE OF MEMBRANE (NON-MEMBRANOUS CROUP), OF MEMBRANOUS LARYNGITIS, AND OF PHARYNGEAL DIPHTHERIA, IN DR. DICKINSON'S PRACTICE, MOSTLY AT ST. GEORGE'S HOSPITAL AND THE HOSPITAL FOR SICK CHILDREN.

TABLE I.—(A) *Non-membranous laryngitis.*

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Hosp. for Sick Children	Jessie Sutton	15 mos.	Nov.	—	Cough 3 weeks; sores on tongue; blebs on lips; whooping inspiration 10 days before death; dyspnœa and recession

(B) *Non-membranous laryngitis. Presumptive*

Ditto	Thomas Woods	2 yrs. 4 mos.	Aug.	—	Croupy attack not very severe; recession; dyspnœa
	(2nd attack	3 yrs.	May		Cough for 1 day; at night croupy
Ditto	James Chaplin	10 yrs.	April	Walked to Woolwich on cold, windy day	Lost voice when he got there; breath at once short; croupy cough, &c., 3 days later
Ditto	C. Lacon (M.)	13 mos.	Nov.	—	Running at nose and eyes; next night croupy cough; much stridor; dyspnœa severe; much recession of chest
Ditto	Fred. Rader	1 year 6 mos.	March	—	Puffy across nose, but no running; laryngeal cough; some recession
Ditto	Alfred Peters	4 yrs.	Aug.	—	Croupy cough came on at 2 a.m.
Vol. ii, p. 172	Charles Renn	5¾ mos.	Feb.	Subject to bronchitis; no cause recognised	Woke up in night with cough, wheezing, and intense dyspnœa of laryngeal character. (Fell on head 2 days before attack.)
Vol. xvii, p. 308	L. W. (M.)	10 yrs.	Jan.	Had been on the previous day to the Crystal Palace with a footman	Suddenly seized in night with croupy symptoms; extreme laryngeal dyspnœa; tracheotomy imminent
Hosp. for Sick Children	Robert Sacoman	5 yrs.	Nov.	—	Marked croupy symptoms followed upon running at nose and eyes, and cough of a fortnight's duration; *measles* came out on 4th day after croup
Ditto	Robert Whalley	4 yrs.	Dec.	—	Cough 2 days before *rash of measles*, next day laryngeal dyspnœa and croup complete; rash came out and explained it

Positive evidence of absence of membrane.

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
—	—	Antimony, emetically and otherwise	D.	Œdema of larynx and 2 or 3 upper rings of trachea	Died at home rather suddenly had been taken out on suspicion of whooping cough	—	Hoarse 4 weeks; laryngeal dyspnœa 9 days.

evidence of absence of membrane.

None seen	—	Antimony	R.	—	Running from nose; swollen gland on each side of neck	—	14 days.
None seen; tonsils red		—	R.	—	—	—	7 days.
None seen; pharynx red	—	Antimony	R.	—		—	35 days.
None seen; fauces congested	—	Antimony and Ipecacuanha	R.	—	Inflammation of conjunctiva	—	25 days.
None seen; pharynx natural	—	Leeches and antimony	R.	—	—	—	13 days.
None seen; tonsils large, red, and showed spots of secretion	—	—	R.	—	Enlarged glands on either side of jaw	—	14 days.
None either seen in throat or coughed up	—	Antimony	R.	—	—	—	11 days.
None seen	—	Ditto	R.	—	Three previous attacks; weather on last cold and windy	—	About 1 day.
Ditto	—	Ditto	Sent out	—	Croup in these cases; early symptoms of *measles*	—	3 days.
Ditto	—	Carbolic spray	Do.	—		—	3 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
St. George's	Daniel O'Connell	3½ yrs.	Nov.	—	Went to bed well; awoke with cough and dyspnœa, which became extreme, and was accompanied with bronchitis; improved for a time, then relapsed, and was taken out in a state of much dyspnœa. (Possibly membrane present, though none seen)
Hosp. for Sick Children	Cornelius Leary	3 mos.	May	—	Subject to cough; cough increased and became croupy
Ditto	Alice Didman	7 yrs.	May	Lay on cold stones in yard	Sore throat for 2 days; croupy dyspnœa came on suddenly at 1 a.m.; croupy symptoms severe and protracted
Ditto	Mary A. Blythe	8 yrs.	June	Caught cold 14 days before admission	Tracheotomy on point of being performed
Ditto	Wm. Harrison	1 year 3 mos.	March	—	Loss of appetite, feverishness, cough, croup
Ditto	Stephan Hagan	1 year 6 mos.	Dec.	—	Hoarseness, cough; woke up suddenly with croupy dyspnœa at 1 a.m.
Ditto	Lawrence Donovan	3 yrs. 7 mos.	Dec.	—	Cough 3 months; spat blood 3 days before attack; attacked suddenly at 7.30 a.m. (woke up); running at eyes and nose on admission
St. George's	Bridget Cullen	6 yrs.	May	Went to bed apparently well, but for a slight cold evening before	Woke at 3 a.m. in a fit of dyspnœa, choking, and making a great noise; mother thought she would have died; brought to hospital 3 hours later in little dyspnœa, but with hoarse cough

TABLE II.—*Membranous laryngitis. Membrane, as far as*

Hosp. for Sick Children	Albert Abbott	10 mos.	Feb.	—	Preceded by 7 days' diarrhœa; brother had stomatitis; begun with gradual accession of croupy breathing

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
[N]one seen (but [s]suspected)	Alb., at first a trace afterwards much	Antimony	Taken out	—	Membrane probably present in this case?	—	15 days.
[N]one seen	—	—	Do.	—	—	—	3 days.
[N]one seen; [b]brought up [t]thick mucus	No alb., trace of sugar	Antimony	R.	—	Rose-rash without rise of temperature on 5th day	—	Croupy dyspnœa 1 month; sore throat 3 days before.
[F]auces normal; [n]none evacuated	No alb.	Emetics, antimony	R.	—	Had 3 attacks of same sort, the one described being the 2nd	—	44 days.
[N]one seen	—	Ditto	R.	—	—	—	44 days.
[F]auces a little [s]wollen; no [m]membrane seen	—	Antimony	R.	—	Dyspnœa great; child rickety; case unpromising; much recession	—	10 days.
[T]onsils red and [s]wollen, but no [m]membrane	—	Ditto	R.	—	—	—	Cough 3 months; croupy seizure 10 days.
[N]o membrane; [t]onsils and [t]hroat congested slightly	No alb.	Ipecacuanha, antimony	R.	—	Symptoms urgent, but with intermissions for about 24 hours, then gave place to ordinary bronchitis	—	11 days.
[c]could be ascertained, confined to larynx and air-passages.							
[L]arynx congested; thin [m]membrane on larynx; bronchitis	—	Antimony	D.	Thin membrane on larynx only, pharynx and bronchial tubes congested	—	—	2 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Hosp. for Sick Children	James Cull	4 yrs.	April	—	Croupy cough succeeded by croupy breathing, 2 days
Ditto	John Dowden	2 yrs.	June	—	Feverish for 6 days, then breathing became difficult and noisy
Ditto	Walter Conquest	5 yrs.	June	Want of air and food; 6 people living in one room	Headache, stomachache, and feverishness; had a cough, got choky, and complained of throat; no running at nose
Ditto	Alfred Churchill	16 mos.	July	—	Running at nose for a week; cough, which became croupy
Ditto	Marriner Hutson (F.)	6 yrs.	Feb.	Succeeded upon typhoid; escape of sewer gas into ward	Pneumonic signs during typhoid convalescence; these succeeded by ringing cough and the expectoration of tubes of membrane
Ditto	James Smith	4 yrs.	Feb.	Succeeded upon measles	Delicate, diarrhœa, &c., caught measles in hospital; hoarse (croupy) cough 2 days after appearance of rash; died within 24 hours of recognition of tracheitis
Ditto	Herbert Haley	2½ yrs.	March	Ditto	Large head; otorrhœa; caught measles in hospital; paroxysms of dyspnœa 2 days after rash, with hoarse cough; died 3 days later more from pulmonary than laryngeal obstruction
Ditto	John P. Lambert	3 yrs.	Feb.	Ditto	In hospital for diabetes insipidus, there caught measles; became hoarse 8 days after appearance of rash; one day out before death

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of tracheotomy from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
None seen in throat, though some expectorated through tube	None	Tracheotomy	R.	—	—	On 3rd	24 days.
None seen in throat; found after death	—	Antimony, tracheotomy	D.	False membrane in larynx and trachea; none above	—	On 2nd	2 days.
No exudations in throat, nor any swelling	Little alb., trace of sugar	Antimony	D.	Membrane confined to air-passages from epiglottis downwards; bronchitis	—	On 5th	5 days.
Nothing on tonsils; no membrane seen in throat, but some expelled from wound	—	Tracheotomy	D.	Thin membrane from true cords to primary bronchi	—	On 2nd	3 days.
Throat perfectly unnatural to examination, but membrane repeatly coughed up; tracheotomy	Alb. after operation	Antimony, carbolic spray, tracheotomy	R.	—	At same time another child had in same ward pharyngeal diphtheria, and a nurse follicular tonsillitis; child's (Hutson's) bed between window and door, but no further reason to attribute attack to cold	On 6th	35 days.
"Fur" on tonsils like that on tongue, but no membrane	No alb.	—	D.	Larynx, trachea, and large bronchi lined with a thick membranous sheath, none on fauces	—	—	3 days.
Fauces clear; glands behind jaw enlarged	—	Antimony, carbolic spray	D.	Much membrane in larynx nearly closing glottis; none in fauces or in trachea or bronchi; lobular pneumonia	—	—	3 days.
No membrane seen during life	—	Quinine, &c.	D.	Larynx and trachea coated with lymph; none in fauces; hepat. in left lung	—	—	1 day.

TABLE III.—*Membranous laryngitis, together with slight*

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
St. George's	Jane Suckling	8 yrs.	June	Has had about a dozen previous attacks of "croup"	Soreness and stiffness about larynx; no nasal discharge or glandular swelling
Hosp. for Sick Children	Annie Thorp	15 mos.	Dec.	No bad smells	Langour, feverishness; after 12 hours quickened breathing, then stridor
Ditto	John Wells	2 yrs. 9 mos.	Nov.	Two brothers and one sister subject to "croup"	Previously well; woke up at 10 p.m. with strange cry; croupy symptoms rapidly supervened
Ditto	Aubrey Peters (M.)	3 yrs. 10 mos.	June	—	Suddenly seized with croupy cough; afterwards laryngeal dyspnœa
Ditto	Ellen Brougham	3 yrs.	May	Sent back from Highgate; "got cold" 12 hours before attack	Formerly had strumous abscesses; no premonitory symptoms noted; stridulous breathing and croupy cough
Ditto	Ellen Smith	8 yrs. 11 mos.	Nov.	—	Slight running at nose, with hoarseness; headache; barking cough; loss of voice and laryngeal dyspnœa
Ditto	William Wood	3 yrs. 3 mos.	May	Cough repeatedly, with running at nose	This succeeded by white spots on tonsils (as stated), and this by gradual accession of laryngeal breathing and stridor
Vol. xvii, p. 139	Maria Sault	3 yrs. 10 mos.	Sept.	—	Fever and slight cough 3 days before stridor

affection, membranous or follicular, of tonsils or fauces.

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
Extensive follicular tonsilitis; no membrane seen in throat, but some seen in trachea	Much	Leeches, antimony, tracheotomy	R.	—	Lungs remarkably free from bronchitis. Gave complaint to nurse	On 6th	41 days.
Fauces congested; no membrane seen until after death	—	Antimony	D.	Patches of membrane on pharynx, membrane from larynx to 3rd division of bronchi, and leading below that into pus	Much bronchitis	—	2 days.
Small white patch on right tonsil; membranous shred in vomit	No alb.	Antimony, tracheotomy	D.	Soft membrane lining whole length of trachea and bronchi	—	On 2nd	3 days.
"Aphthous deposit" on tonsils during life	Slightly alb., afterwards none	Antimony, emetics, tracheotomy	D.	Larynx, trachea, and bronchi to 4th divisions lined with exudation	—	On 2nd	4 days.
Nothing seen in throat	Trace $=\frac{1}{20}$, afterwards $\frac{1}{3}$	Ditto	D.	Membrane from larynx to tertiary bronchi; patches on aryteno-epiglottidean folds	—	On 2nd	5 days.
Patch of exudation on tonsil and another on oropharynx; membranous ridge within glottis; much membrane vomited and expectorated through tube	No alb. (repeatedly examined)	Ditto	R.	—	—	On 5th	33 days.
Membrane expelled through tube	No alb., later $=\frac{1}{6}$ $=\frac{1}{8}$	Pot. Iod., Liq. Hydg., Tracheotomy	R ?	—	Intercurrent measles, afterwards œdema; recovered in general health, but never did without tube	?	?
None seen in throat before death	No alb.	Emetics, antimony, tracheotomy	D.	Soft membrane in larynx, trachea and bronchi; small patch behind each tonsil	—	On 3rd	4 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Vol. xvii, p. 192	— Vokes (M.)	2½ yrs.	Sept.	—	Began with croupy cough without preceding illness; dyspnœa became extreme; tracheotomy imminent
St. George's	Amelia Jackson	4 yrs.	Nov.	Supposed to have caught cold	Cough for 4 days before croupy symptoms; sudden dyspnœa in the night; enlarged glands in neck
Hosp. for Sick Children	Frederick Levy	1 year	April	—	Fortnight before attack spots on gums, lips, and tongue; difficulty of swallowing, then of breathing, and sudden attack of croupy symptoms in the night
Ditto	Bridget Edwards	1 year 8 mos.	June	Child held to open window when could not be taken out	Enlarged glands in neck for a week, then stridor and croup
Ditto	George Price	2 yrs.	March	—	Croupy cough; excavation in tonsil with white contents; "suspicious" of diphtheria; afterwards laryngeal dyspnœa and signs of pneumonia

TABLE IV.—*Membrane extensively present*

Vol. xvii, p. 125	Dr. M—'s boy	2 yrs.	June	—	Pale, sickly, and without appetite for 10 days, then membrane seen on fauces; laryngeal dyspnœa several days later; bronchitic sounds

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
atch of membrane seen in throat (by Dr. Martyn), and nitrate of silver applied	—	Antimony	R.	—	—	—	9 days.
embrane on both tonsils, some coughed up through tube	—	Antimony, emetics, tracheotomy	D.	Membrane on tonsils, back of pharynx, larynx, trachea, and down to smaller bronchi	—	On 2nd	3 days.
o membrane seen in throat, but fauces and tonsils red	Trace of alb.	Antimony	D.	Membrane on posterior wall of pharynx, top of uvula, epiglottidean folds, larynx and trachea; some patches also in bronchi	—	—	4 days.
embrane on tonsils; membrane expelled through tube	Drawn from bladder p.m., highly alb., full of casts	Emetic, antimony, tracheotomy	D.	Tonsils ulcerated; membrane on epiglottis (pharyngeal aspect), also larynx and upper part of trachea; below congested	—	On 2nd	3 days.
White matter on tonsil as described; enlarged glands behind jaw	—	Carbolic spray	D.	Membrane in upper part of glottis and on thyroid cartilage; trachea and bronchi congested and full of purulent fluid; hepat. of left lung, which, with the right, contained tubercles	—	—	18 days.
in throat as well as in air-passages.							
ube of membrane coughed from trachea, beside what was seen on fauces	—	Quinine and iron	D.	—	—	—	From memb. 11 days, laryngeal 1 day.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Vol. xvii, p. 238	Caroline Harris	9 mos.	May	—	Sore throat, difficulty of breathing and swelling of glands about jaws dyspnœa pharyngeal in tone
Vol. xvii, p. 387	Louisa Bird	3 yrs.	June	—	A month before feverish, languid lost appetite, and had running at nose; got better in a week; after 3 weeks attacked again, shivered and became feverish again; had swelling at side of neck, then difficulty of swallowing, huskiness of voice
Hosp. for Sick Children	Emily Burnell	3 yrs. 6 mos.	May	No smell or other obvious cause	Felt sleepy; next day talked thick and 2 days later became stridulous
Ditto	Elizabeth Saala	6 yrs.	Nov.	Drain smells in house. Another child of same family had diphtheria 3 years ago in this hospital	Throat sore 9 days before tracheotomy; membrane on tonsils and pharynx 6 days later
Ditto	Mary Gorfin	3 yrs.	Jan.	—	Feverish and sick; next day fauces in throat; became "light-headed;" diarrhœa
Ditto	Harriett Lester	4¾ yrs.	Aug.	Family lived over a stable, drank from pump just outside	Hoarseness, hoarse cough, at same time feverish, followed by choking dyspnœa in fits, and tracheal respiration
Ditto	Eliza Barnes	7 yrs.	Feb.	Subject to sore throat since scarlatina 3 years before. Attributed to exposure to snow	Caught severe cold in head, chest and throat; 3 days later breathing became difficult

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
None seen during life	—	Puncture of pharynx, antimony	D.	Membrane behind soft palate and on left tonsil, also in larynx, trachea, and to smallest bronchi; small abscess behind pharynx	Post-pharyngeal abscess suspected, punctured for but not hit	—	9 days.
Membrane on both tonsils and fauces (? nitrate of silver had been applied)	Highly alb.	Caustic before admis., emetics, antimony, tracheotomy	D.	False membrane on both tonsils, and from epiglottis to bronchi of 4th division	Papilliform rash over back, passing into pustules; ulcers at corners of mouth; slight discharge from eyes	On 6th	6 days.
Pimples said to have been seen on throat, brush applied; membrane on tonsils, uvula and pharynx, also within epiglottis, also came out of tube	¼ alb., ⅓ alb.	Tracheotomy	D.	Membrane on soft palate, tonsils, epiglottis, and bronchi	—	On 3rd	6 days.
Membrane on tonsils, and stated to have been seen on pharynx; membrane coughed from wound	Alb. = ½, trace of sugar	Ditto	R.	—	No swelling of glands of neck; mother and another child had sore throats at same time	On 6th	33 days.
Membrane on palate	Urine not obtained	Perchlor. of iron, chlorate of potash	D.	Tonsils, uvula, soft palate, epiglottis, and larynx covered with membrane; membrane not below vocal chords	—	—	6 days.
Exudation on fauces and right tonsil	Trace of alb.	Carb. acid spray and chlorine, iron and quinine	R.	—	—	—	30 days.
Fauces and uvula coated with yellowish white exudation	No urine to be got	Tracheotomy	D.	Extension in pharynx, also in larynx and trachea; not in bronchi	—	On 3rd	4 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
St. George's	Lizzie Besley	2½ yrs.	Nov.	Followed upon hooping-cough; accompanied scarlatina?	Much glandular enlargement and discharge from nose; much febrile disturbance; said by the doctor to have scarlatina (and had the rash); much coryza; snoring
Vol. xviii, p. 268	W— (F.)	4 yrs.	Jan.	Scarlatina	On same day that rash came out much membrane in throat, which was sponged with nitrate of silver; that evening croupy symptoms, and long tube of tracheal membrane coughed up

TABLE V.—*Membrane on tonsils, fauces, or*

Hosp. for Sick Children	Lavinia Gale	11 yrs.	July	Drank water from butt, which also supplied W.C.?	Pain in swallowing for a few days
Ditto	Edmund Nowell	10 yrs.	Nov.	Water from cistern over W.C.?	Pain in neck behind jaw; liquids returned through nose
Ditto	Ellen Deacott	4 yrs.	Oct.	Came from All Saints' Orphanage	Jaundice 3 weeks before; mode of accession not noted
Ditto	Daniel Rich	1 yr. 7 mos.	Jan.	Smell of drains?	First noticed swelling in neck; child then thirsty and feverish
Ditto	Charles Denley	10 yrs.	Dec.	Vomiting and headache for some weeks before	Languid and ailing, and had sore-throat
Ditto	Henry Mills	3 yrs.	Feb.	1 brother now in hospital with diphtheria, of which another died 3 weeks ago	Observed to be poorly in morning; in afternoon white patch discovered

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
—	—	Tracheotomy	D.	Pharynx, larynx, and upper part of trachea covered with membrane	Probably scarlatinal	On 3rd	4 days.
Much seen on throat, and tracheal tubes coughed up	—	Chlorine and stimulants	D.	—	Several other children had scarlatina same time	—	2 days.

pharynx, to exclusion of air-passages.

Membrane on tonsils, which were swollen and red	Trace	Chlorine and carb. spray, alt. iron and quinine	R.	—	—	—	17 days.
Continuous over back of soft palate, uvula, and tonsils	Ditto	Tinct. of iron to throat, carbolic spray, iron and quinine	R.	—	Breath offensive; enlarged cervical glands	—	25 days.
Opaque membrane on right half of fauces	Ditto	Chlorine and carb. locally, iron, &c.	R.	—	Glands of neck slightly enlarged; memb. left ulcer, which long remained	—	20 days.
Membrane seen all over fauces by Dr. Bridges	—	Iron, quin., pot. chlr., car. spray	R.	—	Much swelling of glands in neck	—	8 days.
Patch on right tonsil was scraped off	Alb. $\frac{1}{40}$ $\frac{1}{20}$	Quinine, iron, pot. chlr.	D.	Recent pleurisy; tonsils ulcerated; enlarged suppurating glands about neck	Glands of neck swollen; abscess in neck, which was opened	—	13 days.
White patches on uvula and each tonsil	None	Nit. of silv., car. spray, iron, quin., &c.	R ?	—	Ulcer on tongue. Taken out before quite well	—	10 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Hosp. for Sick Childre	Benjamin Wilson	5 yrs.	July	Attributed to drinking water largely contaminated with dung refuse and drainage (see Analysis). ·22 per million of albuminoid ammonia. (Caen Wood, farmer.)	Complained of throat for 5 days
Ditto	John Wilson	7 yrs.	Ditto	Brother of the above. Attacked same time	Feverish, languid, and drowsy; next day throat sore, and had headache
Ditto	Eugene Huon	4 yrs.	June	Child in another part of the house had a croupy cough and recovered	Loss of appetite; looked ill; had lump in neck
St. George's	Ann Hughes (nurse)	29 yrs.	June	In close attendance upon Jane Suckling (Table III)	Throat sore, following evening headache and shivering; no nasal discharge
Ditto	Jessie Goddard	4 yrs.	Dec.	Drain smells in house	Sore-throat, and hoarseness, running at nose

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar. or phar. sym. to rec., death, or removal.
Tonsils, fauces, and pharynx swollen and red. On tonsils patches of exudation as large as peas, specks like follicular tonsillitis, or between that and diphtheria	Faint trace	Chlorine and carb. locally, iron and quinine	R.	—	9 children; 1 died a year ago "from diphtheria." 9 days ago mother confined; 2 days afterwards girl, 2 years old, had erysipelas of arm (from slight wound), which spread. She died with sore throat and dysnœa. (A man and his mother who drank of the same well had violent diarrhœa)	—	29 days.
Tonsils reddened and swollen; no membrane seen; glands at angle of jaw swollen	None	Ditto	R.	—	At same time another child aged rather more, who slept in same room, had sore-throat (diphtheria which extended into larynx, as stated by Mr. Evans, who attended) and died with spasmodic dyspnœa. Baby sickened also and died with purulent ophthalmia and inflammation about navel. All three died within a week. P.S.—Another child in hospital under Dr. Cheadle, belonging to same family, with same symptoms as Benjamin	—	24 days.
Patch of membrane over one of the follicles	Ditto	Carbolic spray, iron, and quinine	R.	—	Large gland below angle of jaw; spleen enlarged	—	5 days.
Uniform white layer over left tonsil, smaller patch on right; sharply defined edge; unconnected with follicles	Ditto	Carbolic spray and chlorine gargle, iron, and quinine	R.	—	—	—	10 days.
Extensive false membrane on palate and fauces	Alb.	Carbolic spray, iron, quinine	D.	Extensive membrane on palate and left tonsil; air-passages free; had running from the nose	—	—	Membrane seen 8 days.

Reference.	Name.	Age.	Month of attack.	Cause.	Preceding symptoms and onset.
Hosp. for Sick Children	Charles Wren	5 yrs.	May	Dung heap under window; also manure pit close by, which was occasionally emptied with much stench. One of the children taken ill day after it was opened	Pain in neck; vomited; shivered; same day mother saw white patch on throat; swelling of glands
Ditto	Lilian Tingey	7 yrs.	April	Water-supply a cistern above a stinking w.c.	Pain in swallowing evening before
Dr. Forshall's case	Dr. P—y	22 yrs.	March	Infection. Attending medically on a nephew 4 years old, who died of diphtheria, making applications to throat, &c. Attacked day of child's death	Feeling of illness and fever; membrane on throat same evening
Mr. Haffenden's case	William W—	45 yrs.	May	All the drainage of the house went into a cesspool a few yards from it, which had not been emptied for more than 15 years. Drinking water from a separate and pure source	Confined to bed with a severe attack of sciatica, which caused much weakness; then complained of difficulty of swallowing and speaking, but had no rigor; membrane then found on soft palate

Membrane as observed in life.	Albuminuria.	Treatment.	Result.	Post-mortem.	Remarks.	Date of trachy. from 1st lar. or phar. sympt.	Dura. of dis. from 1st lar or phar. sym to rec., death or removal.
Membrane on both tonsils	Trace of alb.	Carbolic spray, chlorine	R	—	Another child of same family in hospital with pharyngeal diphtheria, same time a third had sore-throat	—	19 days.
Membrane on both tonsils; enlarged glands	Ditto	Ditto	R.	—	3 children in same family died of scarlatina; 3 now patients in hospital with diph.	—	18 days.
On fauces, tonsils, and back of pharynx	—	Carbolic spray, chlorine, tonics	R.	—	The child from whom the disease was apparently caught was one of the subjects of an epidemic then raging. Dr. P. lived in same house and may have been affected from same cause	—	3 weeks.
On soft palate, uvula, and tonsils; lips and tongue ulcerated; little glandular swelling	No alb.	Disinfectants and tonics	R.	—	A child in same house had at same time an attack of well-marked follicular tonsillitis. At some years' interval were two other outbreaks of diphtheria in same house	—	Ditto.

Analysis of Dr. Dickinson's tables. Dates of attack, arranged according to months.

	Class 1.	Class 2.	Class 3.	Class 4.	Class 5.
January	1	0	0	2	1
February . . .	1	4	0	1	2
March	2	1	1	0	0
April	1	1	1	0	1
May	4	0	2	2	2
June	1	2	3	2	2
July	0	1	0	0	3
August	2	0	0	1	0
September . . .	0	0	2	0	0
October	0	0	0	0	1
November . . .	4	0	3	2	1
December . . .	3	0	1	0	2

Description.	No. of cases.	Causes suggested.						Prodromata.							Albuminuria in urine.	Treatment.			Tracheotomy.	Recovered after operation.	Total results.		
		Exposure to weather (definite).	Foul air or stench.	Foul water.	Infection.	Measles.	Scarlatina.	Abrupt seizure in night.	Cough (not measles).	Coryza (not measles).	Sore throat.	Feverishness or rigors.†	Malaise.	Diarrhœa.		Emetics.	Antimony.	Tonics and antiseptics.			Recovered.	Died.	Uncertain.
1. No membrane seen	19	4	0	0	0	2	0	8	8	3*	1	1	0	0	1‡	4	15	0	0	0	14	1	4
Of the patients in this series (18 in number), 1 had 2 attacks, 1 had 3 attacks, and 1 had 4 attacks.																							
2. Membrane confined to air-passages	9	0	2	0	0	3	0	0	4	1	1	2	0	2	2	0	4	3	4	2	2	7	0
Among these patients (9 in number), the attack was not repeated in any instance.																							
3. Membrane in air-passages, with slight affection of throat	13	3?	0	0	0	0	0	3	4	2	3	2	0	0	6	6	11	1	9	3§	4	9	0
One of these patients said to have had "a dozen" previous attacks of croup. She gave pharyngeal diphtheria to her nurse (had also follicular tonsillitis).																							
4. Membrane extensively present in throat as well as in air-passages	10	1	1	1?	0	0	2	0	1	2	5	3	1	1	4	1	2	4	5	1	2	8	0
None of these known to have had similar complaint before; brother of one had diphtheria in hospital.																							
5. Membrane in throat to exclusion of air-passages . .	15	0	4	5	2	0	0	0	0	1	15	6	1	0	8	0	0	15	0	0	12	2	1
None of these patients known to have had similar complaint before. Of the 15 instances recorded in the table there are 8 in which the subject was attacked																			18	6			

together with others who were exposed to the same influences. This does not include one case in which while one child had diphtheria another had a croupy cough. The table includes 4 instances in which 3 members of the family were attacked with diphtheria at the same time in close succession, and 3 instances in which 2 persons were similarly attacked with diphtheria or follicular tonsillitis. Among these was one case in which the disease was imparted from a child to her nurse (see Case of Suckling, Table 3), and another in which it was imparted from a child to his doctor.

* Present on admission; date of access not noted.

† Membrane possibly present here.

‡ Independently of measles or scarlatina.

§ One of these, W. Wood, had to wear tube permanently.

Observations upon the foregoing tables. By Dr. Dickinson.

The first series, *non-membranous laryngitis,* is remarkably distinct. There was no suggestion of zymotic influence in any case; on the other hand, in four the attacks were attributed to cold, in two of which the exposure was fairly definite in nature and result, in both, the patient had been unusually exposed to cold wind during the day, and was suddenly attacked in the ensuing night. It is to be noted that these attacks are apt to begin abruptly in the night, though this mode of commencement is not peculiar to them, insomuch as it was also noted, though with far less frequency in connection with the membranous affection of the larynx. In a large proportion of the non-membranous class (8 of 19) the attack was preceded by cough; a larger proportion than holds with any form of membranous disease. The presence of coryza furnishes no distinction, as it is occasionally present in all circumstances. The disorder was traced in two instances to incipient measles; in none to scarlatina.

The urine was not found to be albuminous in any case, save in one which it is to be observed was incomplete, and the nature of which was doubtful. The urine was not invariably examined, but it was examined in as large a proportion of instances as in the other classes.

A tendency to recurrence of the attack was strongly marked in this series; one individual having had two attacks, another three attacks, and a third four attacks.

Another distinguishing point is the tendency to recovery or the amenability to treatment. Notwithstanding that dyspnœa in many cases was such as to suggest immediate tracheotomy, yet under steam and antimony, fourteen out of eighteen recovered, one twice, and only one is known to have died. This contrasts very powerfully with all the cases in which laryngeal membrane was known to be present—of the total of which, amounting to 32, 24 ended fatally.

The second class, that of membrane strictly limited to the air-passages, is of small number compared with the instances in which the membranous formation has to a greater or less degree extended above the larynx. It comprises but nine cases. So far as they go they present points of contrast with the preceding class. In no case was exposure to weather apparent as the cause; while in five, the influence of a specific fever or other zymotic poison was indicated, three were associated with measles. In another, a child, Marrener Hutson by name, was seized while in the hospital recovering from typhoid; at the same time that another child in the ward was attacked with well marked pharyngeal diphtheria and a nurse with follicular tonsillitis. The

outbreak was traced to an escape of sewer gas in a water closet opening upon the ward. The child in question, M. Hutson, coughed up a long tube of membrane from the trachea, and eventually recovered after tracheotomy. In the remaining instance the morbid influence was not more definite than the occupation of one room by six persons, of whom the patient was one, together with insufficiency of food. Among these cases feverishness and diarrhœa were noted as precursors of the attack, and in two of the nine, albuminuria as its accompaniment.

But it must be added that, however these cases differed in their progress and result from those of non-membranous inflammation, there was no clinical distinction which could be discerned in the earlier stages.

The third series is that in which membranous affection of the larynx was associated with slight affections of the pharynx or tonsils of the same or a similar kind. In three of these the associated affections took the shape of follicular tonsillitis. This series, together with the one preceding it, may be held to represent what is commonly described as "membranous croup." In the series at present under notice there was a general absence of definitely ascertained cause. In three the attack was hypothetically assigned to cold; in one the child had been habitually held to an open window, but not on any specified occasion with connected result, and in the other instances the action of cold was even more uncertain. Neither in any case was there any definite attribution to foul air or foul water. In the incidence of disease of this class a resemblance to non-membranous croup might be considered to exist in the occasional though less frequent predecession of cough, and in the tendencies each exemplified in one case only, either to attack an individual who has been liable to "croupy" attacks or who belongs to a family, other members of which have had croup presumably of the non-membranous kind. On the other hand, a resemblance to the class of pharyngeal diphtheria could be discerned in the occasional occurrence of premonitory fever. But it must be allowed that neither by what is known of the causes of each attack, nor by the nature of the prodromata, can the class now under discussion be definitely distinguished either from non-membranous croup on the one hand, or from pharyngeal diphtheria on the other. The frequency of albuminuria, however, is nearly that which belongs to pharyngeal diphtheria, not to non-membranous croup; and another fact which is afforded by one of the cases in this category bears upon the relationship of the laryngeal and the pharyngeal membranous affections. The first-mentioned patient, Jane Suckling, had what in common phrase would be membranous croup, together with follicular spots upon the tonsils. The nurse who tended her after tracheotomy, sitting within the tent and frequently being coughed upon through the wound, became the subject of a

membranous affection of the tonsils, which was too continuous to be called follicular, and to which no name but diphtheria could be given. Hence, it is to be inferred that the child's laryngeal affection was also diphtheritic; and the proof is afforded that in this instance at least membranous croup was simply laryngeal diphtheria.

In class 4, where, together with laryngeal membrane, there was extensive membrane in the pharynx, the association with simply pharyngeal diphtheria becomes more marked. Cold was supposed to have given rise to the attack in only one of ten cases; stench and foul water were each mentioned in one instance, and the relationship to the zymotic diseases was further declared by the record in more than a fourth of premonitory fever or malaise. It is to be noted that among these cases was one in which the disease was probably, and another in which it was certainly, produced as part of an attack of scarlatina.

Class 5 represents cases of undisputed pharyngeal diphtheria, and only concerns the questions now before the Committee as supplying a standard of comparison. Cold takes no place among the hypothetical causes. Nine out of the fifteen cases were traced conclusively, or with merely probability, to foul air or foul water. It is to be observed that in a large proportion of cases the contents of drains, water-closets, cesspools, and dungheaps appear to have been concerned in the production of the disease, whether by means of poisoned water or foul air. Two of the fifteen were apparently due to infection, in one case a fatal attack of pharyngeal diphtheria gave rise to pharyngeal diphtheria in the medical attendant, who had been closely employed in dressing the throat, in the other, a child with laryngeal diphtheria (Suckling, Table 3), gave pharyngeal diphtheria to her nurse. Some of the cases have interest as showing a relationship between the diphtheritic and other morbid influences. The inmates of a farmhouse, including eight children, drank of a well into which drain refuse entered; a man and woman who lived near drank of the same water. The man and woman both had severe and protracted diarrhœa. Of the children one died of erysipelas with some affection of the throat, another (a new born infant) of purulent ophthalmia, together with inflammation about the navel, and four had diphtheria, in three cases confined to the pharynx, in one entering the larynx with a fatal result. The three children who died did so within the space of one week, and the three who recovered were ill at the same time. Whether the several disorders were derived by infection from the person or by means of the water, these cases at least suggest that diarrhœa, erysipelas, purulent ophthalmia, and diphtheria may be produced in different persons, either by the same influence or by influences which are derivable from each other.

Another point of morbid relationship which these tables exem-

plify, though there is not wanting other evidence to the same effect, is that follicular tonsillitis may be derived from diphtheria, as indicated by a continuous membrane, or may have a common origin with it.

The only natural division markedly indicated in this series of cases is into non-membranous and membranous disease. But it is also manifest that the history and general symptoms of the membranous cases differ according to the part attacked, the evidence of contagion and of constitutional affection being generally less marked where the disease is chiefly laryngeal than where it is chiefly pharyngeal.

Some remarks on Dr. Dickinson's tables. By Dr. Hilton Fagge.

It appears to me important that Dr. Dickinson's tables should be studied from both points of view—(1) that of those who hold that all membranous croup is diphtheria, and (2) that of those who hold that there is a membranous croup distinct from diphtheria, but constituting one disease with (at least) the more severe forms of non-membranous croup.

As I at present hold the second view, I propose to discuss the tables in order to see whether they are not as consistent with it as with the first view.

I may point out that the *form* of the tables is such as to favour rather the first view, by making it more simple of application, since it would place the boundary line between Series I and Series II; whereas, if one holds the second view, it is still a question whether the boundary line lies between Series II and Series III, or within Series III itself, or between Series III and Series IV.

Even on the first view, however, the application of the tables is not quite so simple as at first appears. Dr. Dickinson himself remarks that it is a question whether in the case of Daniel O'Connell (which is included among the non-membranous cases) membrane was not really present. The urine was albuminous, and one might be inclined to think that this really was a case of diphtheria, but for the long duration of the disease (fifteen days) before the child was taken away from the hospital by the friends.

But, in other respects, I cannot agree with Dr. Dickinson that between Series I and Series II, "a natural division is markedly indicated." To me it seems that the facts are just what one should expect, if the division were altogether an artificial one, Series I including those cases of croup too mild to be attended with the formation of membrane. For only one case proved fatal, and of the rest a large number could at once be set down

as being probably "spurious," by their recurring again and again in the same individual, or by their sudden onset.[1]

The most striking exception is the case of E. Lacon. Now with regard to this case it is to be noted that the evidence, as to the absence of membrane stands in very nearly the same position as it would have stood in three or four out of the six cases in Series II, if in the latter there had not been a post mortem to show the presence of membrane. There is not a single one of the cases in Series II in which membrane was seen before tracheotomy, or before death, except that of Marrener Hutson (which is proved by several heads of evidence to have been one of laryngeal diphtheria). It may be said that if the cases in Series II had lived long enough, or had recovered, the membranes must have been expelled; but I am not at all convinced of this.

Turning now to the question of the relation between Series II (of membranous laryngitis confined to the air-passages) and Series III—V, it seems to me that Dr. Dickinson's facts are quite consistent with the (second) view that whereas Series V and IV contain none but cases of diphtheria, Series II and Series III, one or both, contain a mixture of cases of laryngeal diphtheria with cases of an independent membranous croup.

[1] Dr. Dickinson has shown that in *some* cases in which membranous exudation exists in the larynx there is a sudden commencement of symptoms in the night; but I think that the presumption is in favour of the attack being more alarming than dangerous when it commences in this way.

APPENDIX VI.

DR. HILTON FAGGE'S COLLECTION OF CASES.

THINKING that a summary of the experience of a large metropolitan hospital would be useful to the Committee, I asked Mr. W. H. Lamb, M.B., who was my clinical assistant in 1877, to collect, from the volumes of medical, surgical, and pathological records, all the cases of croup and diphtheria which he could find. Subsequently I published short notes of them in the 'Guy's Hospital Reports' for 1877, believing that this would render them more available for the objects of the Committee than they otherwise would be.

In the following year Dr. Gee made a similar collection of cases from the Hospital for Sick Children, but in a somewhat different form. I have now placed my cases under the same tabular arrangement which he adopted, so that they can be readily compared.

The first twenty-two of my cases were, in a certain sense, beyond the aim of the investigations of the Committee, being cases of diphtheria, in which there was no evidence that the morbid process extended to the air-passages. Dr. Gee did not include such cases in his tables, and I have therefore now omitted them from mine. But I may state that they were very heterogeneous in their character. Seven of them only were undoubted cases of genuine diphtheria, admitted into the wards for that disease; eight of them arose by contagion in patients already in the hospital for some other complaint; the remaining seven were cases of diphtheria secondary to pyæmia or Bright's disease, or were altogether doubtful in their nature. It will subsequently appear that this small number of cases of indisputable pharyngeal diphtheria probably has a somewhat important bearing on the question of the relation of membranous croup to that disease.

CLASS

TABLE I.—*Cases of diphtheria in which the air-passages were involved*

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy
23	Aug. 13, 1876	Child had been in house where another had died of diphtheria	—	None	Dyspnœa	Yes
24	Aug. 8, 1876	No data	Slight spasmodic cough	Throat could not be seen	From first	Yes, Aug. 9
25	Aug. 30, 1875	Ten days before one sister died	Aug. 16, cold and croupy cough	Soft palate	None on admission, September 2	Yes, Sept. 2
26	Sept. 15, 1873	Attributed to getting wet	On admission	Tonsils and uvula, milky-looking secretion, Sept. 15, shred adherent also to uvula	On admission	Yes, Sept. 16
27	July 16, 1872	Recently had measles and scarlatina	July 14	None	Ditto	Yes, July 16
28	Sept. 3, 1867	One of four children, all died			No other history	
29	Mar. 22, 1862	Two children lost with diphtheria	—	On admission, March 22	—	—
30	May 20, 1874	No data	—	May 20	May 20	May 20
31	Nov. 21, 1873	Ditto	Nov. 15, hoarse dyspnœa and cough	Not mentioned	Nov. 15	Nov. 21
32	Dec. 18, 1860	Three other children in same house had died with similar symptoms; scarlatina in neighbourhood	Dec. 8	Ditto	—	No
33	Oct. 19, 1873	No data	Oct. 17, wheezing	Patch on right tonsil, Oct. 19	Oct. 17, wheezing	Oct. 19

Section 2.

the fauces being at the same time affected to a marked extent.

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
Albuminous	Death, Aug. 18	Posterior wall of pharynx and nasal angle = whitish-grey mucus	Lined with false membrane; at vocal cords could just be scraped off, below vocal cords completely detached.	
No note	Death, Aug. 9	Membrane	Membrane.	
Slight traces, Sept. 2	Death, Sept. 4	Ulcerations on uvula and free edge of soft palate	At bifurcation of trachea distinct membrane; tenacious also in bronchial tubes (small).	
Albuminous	Death, Sep. 17	No post mortem.		
Albumen, July 19	Death, July 20	Soft palate, grey lymph thickened	Whole larynx affected; ulcer below left vocal cord	Disease spread to another patient
	Death, Sept. 4	Membrane on soft palate, fauces, pharynx	Thick false membrane.	
Albumen with casts	Death	Tonsils, pharynx, soft palate, a thin membrane	Epiglottis and glottis swollen; on vocal cords and trachea small pieces of membrane.	
No data	Death, May 21	Mucous membrane, fauces, tonsil, uvula, &c., of a yellowish hue	Larynx and trachea full of brownish pus.	
Ditto	Death, Nov. 22	Membrane on right tonsil and lateral and posterior wall of pharynx	Larynx stuffed full of lymph; whole trachea lined with lymph.	
No data; hæmorrhage from bladder	Death, Dec. 20	One tonsil enlarged	Upper part of larynx and vocal cords enlarged; both sides of epiglottis and vocal cords covered with lymph	Hæmorrhage from bowels.
No data	Death, Dec. 23	Patches of lymph on pharynx and right tonsil	Membrane lining whole of larynx and extending into bronchi.	

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
34	June 2, 1869	No data	May 30	No data	—	June 2
35	Oct. 18, 1872	Ditto	Oct. 16, dyspnœa	Back of fauces	Laryngeal	May 19, 1.30 a.m.
36	Nov. 14, 1872	Ditto	Swallowed with difficulty one month ago	No data	No data	Yes
37	July 21, 1869	Ditto	July 18, dribbling	Ditto	July 21, dyspnœa	July 22
38	July 7, 1876	Ditto	Dyspnœa	Ditto	—	Yes
39	April 14, 1865	Ditto	No data	Ditto	No data	No data
40	Mar. 19, 1864	Ditto	Ditto	Ditto	Ditto	March 19 (on admission)
41	April 14, 1863	Ditto	Sore throat and croup, April 7	Ditto	Ditto	No data
42	Aug. 7, 1861	Ditto	No data	Ditto	Ditto	Ditto
43	Feb. 28, 1872	—	—	—	—	—
44	Nov. 6, 1873	—	—	—	—	—
45	Mar. 21, 1862	Caught in hospital	—	—	—	—
46	Oct. 18, 1874	Ditto	Sore throat just before she was transferred	—	—	—
47	Aug. 10, 1864	Ditto	—	—	—	—

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
No data	Death, June 2	False membrane from posterior nares to cricoid, then from epiglottis through larynx to bifurcation	On fauces, stuck tightly	Brought in, in a dying state.
Ditto	Recovery, Nov. 20	—	—	Each time canula was drawn out lymph, which left a cast.
No albumen	Death, Dec. 17	Patches of lymph on tonsils	Larynx swollen; patches of lymph.	
No data	Death, July 24	No report of post-mortem.		
Ditto	Death	False membrane, soft palate, tonsils	False membrane, larynx, trachea, bronchi could be drawn out easily in casts from bronchi and divisions	Kidneys congested, excess of epithelium.
Ditto	No data	Soft palate, tonsils, pharynx, covered with false membrane (patches)	Epiglottis, larynx, trachea covered with a firmly adherent continuous layer of lymph	Lobular pneumonia found at post mortem.
Ditto	Death, Mar. 20	Lower part of tonsils, membrane continuous to epiglottis	Membrane on both aspects of epiglottis and in larynx and trachea	A little lobular pneumonia at post mortem.
Ditto	Death, Apr. 15	Tonsils, palate, false membrane firmly adherent	Epiglottis, larynx, vocal cords, trachea, a layer of false membrane easily separable	Purulent fluid in bronchi; no tubercle.
Ditto	Death, Aug. 8	Tonsils, false membrane as thick as a shilling, fœtid ulcers	False membrane, larynx, trachea, bronchi, lost in purulent pus.	
—	Death, Mar. 1	Diphtheritic	Œdematous diphtheritic membrane.	
—	Death, Jan. 26	Thick membrane on epiglottis; extended from pharynx, through larynx and trachea, into smaller bronchi.		
—	Death, Apr. 10	Palate, pharynx, exterior of glottis, covered with false membrane; membrane extended as far as vocal cords; trachea, &c., healthy		Double psoas abscess; diseased spine.
Albumen, sp. gr. 1022	Death, Oct. 23, exhausted	Epiglottis, vocal cords, soft palate, injected tonsils large; no disease or membrane		In Dorcas Ward some months previously for talipes equinus
Albuminous, highly so	Death, Nov. 26	Palate, tonsils, pharynx, to œsophagus, covered with false membrane; membrane continued below vocal cords into trachea and bronchi; large abscess in left thigh; commencing waxy change		Compound fracture of leg.

TABLE II.—*Cases in which the air-passages were mainly attacked,*

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
48	Sept. 1, 1876	No data	—	—	Aug. 31	Sept. 1
49	Jan. 9, 1875	—	Cold and violent cough, Jan. 6	None	—	Jan. 9
50	Mar. 5, 1875	—	Cold and hoarseness, Feb. 20	—	—	March 6
51	Apr. 22, 1871	—	April 15, fever and sore throat	—	—	April 23
52	Sept. 9, 1874	—	Sept. 8, croupy cough	Sept. 10, left tonsil	From first	Sept. 10, tube removed on 20th
53	Oct. 18, 1872	Oct. 11, got wet and caught cold	—	—	From first, or nearly so	Oct. 18
54	Sept. 18, 1872	—	—	—	—	Sept. 19, died during operation
55	July 10, 1871	—	Ailing since July 3	—	July 8	July 10
56	Oct. 21, 1867	—	—	—	—	Oct. 21
57	Aug. 28, 1874	—	Aug. 23, cough	—	From first	Aug. 28

the fauces being affected in a very slight degree only, if at all.

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
—	Death, Sept. 1	Membrane on larynx; membranes with superficial ulceration on labia minora.		
—	Death, Jan. 11	Epiglottis was covered on both its surfaces with a soft layer of yellowish membrane; isolated patches of the same on tonsils and interior of larynx to tracheotomy wound.		
—	Death, Mar. 10	No membrane could be found in any part save trachea		On removing tracheotomy tube membrane was expectorated once or twice.
—	Death, Apr. 23	A few patches of lymph on laryngeal surface of epiglottis.		
Albumen, Sept. 12	Cured, Oct. 31	—	—	
—	Death, Oct. 20	Tonsils swollen, patches of lymph about them	False membrane in larynx adherent to vocal cord.	
—	Death, Sep. 19	Slight membrane over posterior wall of pharynx; tonsils rather worm eaten	Laryngeal aspect of epiglottis covered with white membrane; this extended into larynx and trachea.	
—	—	Small patches of membrane on tonsils	Tough false membrane from larynx to bronchi.	
—	Death, Oct. 23	Tonsils false membrane	Larynx, trachea, bronchial tube, false membrane	Several pieces of membrane came away with tracheotomy tube.
—	Death	—	Upper part of larynx filled with a detached mass of membrane extending to vocal cords	Note by Dr. Taylor.—The tonsils when I saw them appeared to be old enlarged tonsils, slightly inflamed.

CLASS 2.—TABLE III.—*Cases of Membranous Laryngitis of doubtful origin secondary to any other disease*

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
58	Oct. 28, 1875	From getting wet 14 days ago	Cough	None	From Oct. 27	Oct. 28
59	June 9, 1874	June 5, cold water spilled over him	June 7, cough "barking"	Ditto	From almost the first	June 10
60	Nov. 8, 1873	Nov. 7, slept in a damp room	Nov. 8, 5.30 a.m., cough, breathing wheezing and loud	Ditto	From first	Nov. 8, 10.30 p.m.
61	Jan. 9, 1873	No data	Jan. 8, catarrh, difficulty of breathing	—	Ditto	Jan. 9
62	Mar. 8, 1872	Ditto	Mar. 8, on admission	—	From first, on admission	March 8
63	July 24, 1868	Ditto	Was in a state of extreme dyspnœa on admission	—	Ditto	July 24; in a dying state

as diphtheria, but not directly caused by local injury to the throat, nor of the larynx or trachea.

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
—	Death, Oct. 29	No membrane in pharynx	Bronchial tubes contained pus; mucous membrane over arytenoids and over pharyngeal aspect of cricoid cartilage injected; trachea very small, narrowed by thickened mucous membrane, could not have admitted a pencil.	
—	Death, June 12	Pharynx healthy; no lymph	From rima to 2 inches below thyroid a delicate, easily detached membrane; beyond this the tubes were full of pus.	
No albumen	Death, Nov. 14	—	A thin layer of lymph below vocal cords as far as bifurcation of trachea	Effect of operation was good, respiration became easy, lividity disappeared, child was soon asleep.
Ditto	Death, Jan. 9, afternoon	Pharynx healthy	Epiglottis on both sides covered with closely adherent membrane; in larynx above vocal cords similar patches	Jan. 10. — In the afternoon child coughed up a plug of membrane.
No data	Death	—	Larynx lined as high as upper edge of epiglottis with distinct membrane; below wound this passed into a more purulent-looking stuff; it extended as low as 2nd division of bronchi.	
Ditto	Ditto	—	Epiglottis, larynx, swollen, the latter having a thick fibrinous cast; false membrane on trachea, hinder surface.	

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
64	June 15, 1868	No data	Cough for 9 days	—	Just before admission	June 15
65	Oct. 7, 1868	Ditto	Fourteen days before admission; cold, with slight cough	None	On admission	Oct. 7
66	Jan. 9, 1868	Ditto	For week or two had slight cough, wheezing	No data	Ditto	Jan. 9, laryngo-tracheotomy
67	Sept. 22, 1867	—	—	—	—	—
68	Mar. 19, 1865	—	—	—	—	March 19
69	July 31, 1864	—	—	—	—	Died same day on operation table
70	Aug. 13, 1876	—	—	—	—	—
71	Jan. 4, 1856	—	—	—	—	—
72	May 5, 1864	—	—	—	—	May 5, on admission
73	June 16, 1857	—	—	—	—	June 16, on admission

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
o data	Death	—	Epiglottis and larynx thickened and swollen, posterior surface of former covered with false membrane; tracheotomy tube had pushed false membrane before it, not piercing it, and forming a valve.	
itto	Death, Oct. 9, from asphyxia	—	All the tubes contained prolongation of false membrane.	
itto	Death, Jan. 11	—	Upper half of trachea, false membrane thick and tough around vocal cord, reached 1½ in. above glottis.	
—	Death	—	False membrane extending from larynx into bronchi.	
o data	Death, Mar. 21	—	Plastic lymph in larynx and trachea, easily detached and coming off in shreds.	
—	Death, July 31	—	False membrane commenced just above artificial openings, and extended near to bifurcation.	
—	Death as soon as admitted, Aug. 13	—	Slight œdema; a little lymph, a definite broad patch, just below vocal cords.	
—	Death, Jan. 5	—	Whole surface of trachea from superior vocal cords to bifurcation lined by a tenacious white membrane.	
—	—	—	Adherent false membrane in larynx, trachea, and bronchi; whole of air-passages acutely inflamed.	
—	—	—	Under surface of epiglottis, larynx, trachea, and bronchi, covered with false membranes, which adhered in shreds.	

No.	Date of admission.	Ætiology.	First symptoms.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
74	Jan. 19, 1858	Five weeks ago scarlatina in house; 6 days ago caught cold	Cold, cough, dyspnœa, Jan. 13	—	On admission	Jan. 20
75	Mar. 7, 1871	—	Cough, cold, dyspnœa, admission	—	—	March 8, child became easier
76	Dec. 10, 1869	Cough for 1 month	—	—	—	—

CLASS 3.—TABLE IV.—*Cases of Laryngitis having a clinical resemblance*

77	Jan. 28, 1868	Cold last week	Suddenly taken ill at 2 a.m., Jan. 28	—	—	Jan. 28, brought the child round
78	Oct. 6, 1869	Three weeks ago had scarlatina	Oct. 29, cold and dyspnœa	—	Jan. 29	Jan. 29, at noon, during operation child vomited freely, appeared much relieved
79	Mar. 9, 1867	No data	Cold for some days	None	On admission, Mar. 9	March 9
80	July 12, 1867	—	Cold for some days past	No membrane	On July 12	July 13
81	Mar. 17, 1867	Convalescent of measles, breathing worse since	March 11, slight sore throat	None	—	No
82	Feb. 23, 1869	—	—	—	—	—
83	Apr. 16, 1874	Cough since April 4; no history of infection	—	—	—	—
84	Mar. 24, 1874	Always had cough	Croupy cough and dyspnœa 4 days before admission	—	—	—

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
—	Death, Jan. 23 suddenly	—	Inflammation of the whole of air-passages	Child's sister, æt. 8, admitted with croup Dec. 12, 1857; tracheotomy performed, and she was sent out Dec. 17.
—	Death, Jan. 11	—	False membrane in larynx, trachea, and bronchi.	
—	Death, Dec. 15	—	Acute plastic laryngitis; membrane adherent to vocal cord.	

those of croup, but in which no false membrane was found to exist.

—	Death, Jan. 30, from convulsions	No post mortem.			
—	Oct. 7, death	Ditto.			
data	Recovery, April 20.				
albumen	Recovered, Aug. 7.				
data	Recovered, April 7	—	—		Improved daily.
—	Taken out by parents somewhat relieved				
—	Gradually improved, and went out May 1.				
—	Gradually improved, and went out on April 14.				

No.	Date of admission.	Ætiology.	First symptoms of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.	Tracheotomy.
85	Oct. 23, 1874	Nineteen days ago first lost her voice	Nineteen days ago dyspnœa; has catarrh	—	—	Oct. 23, 2 p.m (death seem ed imminen just befor operation)
86	Jan. 3, 1874	—	Christmas day, wheezing and drowsiness	No membrane	On admission	Jan. 3, dys pnœa s urgent, opera tion perform ed (just be (fore opera tion temp 97·8°, puls 168, resp. 36 even. temp 101·0°, puls 160, resp. 52
87	Aug. 26, 1876	—	Two days before admission croupy voice	Ditto	Ditto	Aug. 27, a there wa great dy pnœa trache otomy wa performed; marked re lief followe
88	Feb. 21, 1876	Child and two others just recovered from morbilli	—	Fauces and soft palate little injected no deposit	On admission paroxysms of ringing cough	No

Urine.	Result.	Post-mortem examination.		Remarks.
		Resp. fauces.	Resp. larynx.	
umen, th, urine rmal	Discharged well, Nov. 24.			
albumen	Went out well March 27	—	—	Was in hospital till Feb. 27; readmitted on Feb. 28, owing to râles heard in chest.
data	Discharged, Sept. 25	—	—	Continued to improve daily after operation; tube removed Sept. 5.
tto	The brassy cough gradually diminished in frequency. Mar. 1st, went out	—	—	

The paper in the 'Guy's Hospital Reports' contained a fourth class of cases, which, like the first twenty-two cases, correspond with more of Dr. Gee's cases; namely, cases of membranous laryngitis, with or without pharyngitis, directly caused by local injury to the throat, or secondary to pre-existing local disease. Of cases due to injury there were eleven; five were secondary to some local disease of the air passages of lungs. For details of, refer to the 'Reports.'

The following are the conclusions which I thought I might legitimately draw from my cases, without prejudice to the main question before the Committee.

"In the first place, I think that the cases in Class IV negative the *à priori* argument that the mucous membrane of the air-passages is not likely under simple (or non-specific) irritation to take on an inflammatory process attended with the formation of false membranes. There are recorded sixteen instances in which a membranous laryngitis was developed as the result of scalds by hot water, after the entrance of a foreign body into the trachea, after a cut throat, after tracheotomy for various conditions, or secondarily to some disease of the air-passages. Some of the cases in question might, indeed, be plausibly attributed to infection from tracheotomy instruments, if we were to suppose those instruments to have been previously employed for cases of diphtheria, and to have been insufficiently cleaned, Mr. Howse has told me that he believes this to have occurred in Case 89, which came under his observation at the time. But this explanation goes only a very little way.

"Secondly, the cases in Class IV show that, great as is the anatomical difference in structure between the pharyngeal mucous membrane and that which lines the larynx, it is no barrier to the transference of morbid action from the former to the latter surface. The same thing is notoriously true as regards diphtheria. But if a plastic laryngitis may be set up by extension downwards from the pharynx, one does not see why a membranous pharyngitis may not be consecutive to a similar affection of the air-passages; in other words, there is no reason for supposing that a simple membranous croup (if such an affection exists) may not be attended with the formation of false membrane upon the fauces.

"Thirdly, the cases of laryngitis recorded in Class III, in which no false membranes were proved to have been formed, do not appear to have differed notably in their clinical features from those in Class II, in which false membranes were discovered after death, or expectorated during life. So far as the imperfection of these Reports enables us to judge, there is only one case (Case 77) which presented any of the characteristic of 'stridulous laryngitis' in 'spurious croup.' It seems to me that this affection as it is described by French writers has a fair claim

to be considered a separate member of the nosology, its distinguishing features being its liability to return again and again in the same patient, and the suddenness of its commencement, with symptoms which from the very first are of the most alarming character, but which quickly subside and never lead on to a persistent attack, lasting for several days without intermission. Unless, however, we insist upon these characteristics, I can perceive no valid reason for drawing a boundary line between those cases of croup in which membranes are, and those in which they are not, found to exist. In many of the former cases they are not discovered until a post-mortem examination is made. Now, the latter cases are seldom, if ever, fatal. I cannot find in our records a single case of croup in which the patient died and no false membranes were found.[1] If, on other grounds, membranous croup can be shown to be always a laryngeal diptheria, the distinction between the two sets of cases is of course necessary. But unless this can be done, to suppose that such a distinction exists is almost the same thing as to assume that a disease, when it is fatal, is attended with morbid changes essentially different from those which characterise it when recovery takes place. And I submit that this is altogether without precedent in pathology. Considering that in every instance in which false membranes are found in the air-passages, they shade off into muco-purulent matter in the trachea or bronchi,—and that, in some instances, there are only small shreds of lymph imbedded in such secretion within the larynx itself,—it is surely very improbable that the presence or absence of false membranes forms an absolute distinction between two entirely different diseases. My own opinion is that the cases in Class II and those in Class III should be associated together under the common name of croup, assuming always that it is not proved that those in Class II belong to diphtheria.

"Fourthly, we now come to the question as to the relation between the cases in Class II and those in Class I; and at first sight there seems to be a very marked contrast between them. In Class I we have a highly infectious disease, of which albuminuria is a very frequent symptom, and which is often attended with swelling of the cervical glands. In Class II we have a disease which seems not in a single instance to have arisen in contagion, nor to have spread to other patients; in only one of the nineteen cases of this class was albuminuria noticed to have been present; and I think there is only one in which the glands are said to have been swollen.

[1] Since this was in type I have made a post-mortem examination in a case of croup, in which death occurred after fifty-one hours' illness, and in which the larynx was perfectly healthy, but the trachea and bronchi contained a soft, viscid, muco-purulent material, without even any shreds of false membrane in it.

"But I am bound to say that a closer analysis of the cases in Class I throws some doubt upon the validity of the distinctions to which I have just referred; and I must acknowledge my indebtedness to Dr. Greenfield for having suggested to me certain objections which might fairly be made to them.

"The first point is the preponderance of children among those cases in Class I, in which diphtheria spread to the air-passages. Among the cases contained in Section 2 of Class I there are twenty patients who came into the hospital suffering from diphtheria; five who caught it while in the wards. The latter were adults; but of the former twelve were under the age of five years, four between the ages of five and fifteen, and four above fifteen years old. And all but one of the cases in Section 3 were those of children under five years. Again, there has not been a single case in which a child below that age has died of diphtheria in the hospital, and has been found to have its larynx free on post-mortem examination. This excessive liability of children to be affected with the laryngeal form of diphtheria, at the very age which has been generally supposed to be that at which croup is most apt to occur, may certainly be made a point in favour of the identity of the two diseases.

"Again, we find a difference in the extent to which the cases in Sections 1 and 2 respectively can be brought into connection with other cases of diphtheria, either as having caught the disease from them or given it to them. Among the fifteen indisputable cases of diphtheria in the former section there are eleven in which such a connection can be traced. But of the twenty-five cases in the latter section there are only eight in which the existence of a contagious or epidemic influence is recorded. One therefore is not surprised to find that not one of the cases in Section 3 afforded an instance of the manifestation of such an influence. It undoubtedly seems as though diphtheria were less contagious in proportion as the fauces are less severely affected. The comparatively rapid course and early fatal termination of the cases in which the disease extends to the air-passages suggests itself as an explanation, but I doubt whether it is a satisfactory one. The only way of interpreting the cases in Class I by which one could avoid this conclusion would be by supposing that a non-specific membranous croup may be attended with the formation of extensive patches of false membrane on the fauces; in other words, that a large number of the cases in Section 2, and almost all those in Section 3, are not instances of diphtheria at all. This is a question to which I shall presently return.

"But, if it be true that laryngeal diphtheria is comparatively little contagious, one can hardly attach much importance to the fact, which at first sight appeared so striking, that no contagion can be traced in any of the cases of membranous laryngitis in Class II, which I have classified as of doubtful origin.

"Another point on which I was at first inclined to lay great stress is that no instance of membranous laryngitis, apart from pharyngeal diphtheria, has occurred among those cases in which the disease has arisen by contagion in persons already in the hospital. But it may be argued that if laryngeal diphtheria is peculiar to children, one would hardly expect to find it developing itself in the wards of a hospital like Guy's, in which the great majority of the patients are adults. Still there are some children in almost every division; and I think that some importance may fairly be attached to the fact just stated. The experience of a hospital specially devoted to children's diseases would be of great value.

"Other points of distinction failing us, we can fall back upon the general numerical ratio between the cases of recognised diphtheria and those of membranous laryngitis admitted into the hospital, and we may ask whether there are not too many of the latter to be set down as instances of an exceptional variety of the former disease. Now, so far as I know, the only trustworthy statements as to the frequency with which diphtheria when epidemic attacks the larynx without at the same time affecting the pharynx or tonsils are those of Bretonneau and Guersant.[1] Guersant ('Syd. Soc. Memoirs,' p. 216) says that the number of such cases may perhaps amount to a twentieth of all cases of diphtheria, but he implies that unless the fauces are inspected from the very commencement of the disease the presence of slight membranes upon them is apt to be overlooked. Bretonneau relates only one case of what he believed to be purely laryngeal diphtheria among the forty-five recorded in his papers on the subject; and in that instance (p. 165 of Syd. Soc. translation) there is really no proof that the disease was diphtheria rather than simple croup. He goes on to say that it was the second time, and in the proportion of one to thirty, that he had met, after death, with diphtheritic inflammation limited to the air-passages.

"At Guy's Hospital we seem to have had nineteen cases of membranous laryngitis to fifty-seven of diphtheria. It is true that the reports of many of the former cases are imperfect; but I do not think it is likely that the clinical clerks have often failed to note down the presence of false membranes upon the fauces, where any have been detected; and as their absence has for years past been regarded as the crucial distinction between the two diseases, they are certain to have been looked for. But

[1] Since this was written I have read Dr. Yeats' account of an epidemic which occurred at Auchtergaven in Perthshire ('Ed. Med. Journ.,' 1876). Among 183 cases there were 15 in which laryngeal symptoms were present from the commencement, but in which there was no visible affectino of the fauces, when they were first brought under notice; and in 6 of these the pharynx remained free during the whole progress of the disease.

whatever deduction should be made, on the score of incompleteness, from the cases of membranous laryngitis, a large deduction must also be made from those of diphtheria before a fair comparison can be instituted. For in ten of the latter cases this disease arose by contagion in persons already in this hospital; and Class I includes several other cases of which the real nature is altogether doubtful. Now, I do not see any reason why diphtheria should attack the larynx more often when it is sporadic than when it is epidemic. I, therefore, must regard the relatively large number of cases of membranous laryngitis as a weighty argument in favour of the separate existence of a membranous croup.

"Hitherto I have argued the question on the basis that the presence of patches of false membranes on the fauces proves a case to be one of diphtheria. But, after all, this is an assumption, and one which, as I have already shown, is rendered improbable by the fact that in the cases in Class IV the pharynx and the larynx have frequently been found to be simultaneously affected. Between the years 1839 and 1849, long before epidemic diphtheria was prevalent in London, Dr. West found that the velum and tonsils presented false membranes in a considerable proportion of his cases of croup. I am not at all sure that the real solution of the difficulty may not be found in abstracting from diphtheria a considerable number of the cases in Section 3, and evén some of those in Section 2, of Class I. We should then get rid of the puzzling anomaly that the disease seems to be so much less contagious when it mainly affects the larynx than in the ordinary pharyngeal variety.

It is possible that a further head of evidence in regard to the question of the relation of membranous laryngitis to diphtheria may be found in the proportionate number of males and females especially attacked by these diseases. All writers say that croup is more common in boys than in girls. This is confirmed by the cases in Class III, as regards the affection in which no false membranes are developed. But diphtheria is equally prevalent in the two sexes. If, therefore, males should preponderate among those who suffer from membranous laryngitis, one would be disposed to associate it with croup; if not, one would rather take it for a form of diphtheria. Now, in Class II there is no excess of boys; but it is curious that they do preponderate among the cases in Section 3 of Class I.

"Let me recapitulate, in somewhat different language, the main conclusions to which the facts recorded in this paper appear to lead us:—We find that the attempt to separate from diphtheria a membranous croup in which the fauces remain entirely free from false membranes is beset with difficulties. The cases (which must then be called cases of diphtheria) in which the air-passages are attacked, the palate and tonsils being

but slightly affected, occur almost exclusively in children; and they are seldom, if ever, infectious, whereas pharyngeal diphtheria is highly infectious. But when one has once admitted that the different forms of diphtheria present different degrees of infectiousness, and that each of them occurs with special frequency at a particular period of life, one is debarred from insisting on the sporadic character of membranous laryngitis, and the fact that it never arises in the wards of a general hospital, as proof that it is distinct. It is otherwise if we draw the boundary line, not between the cases in Class I and those in Class II, but within Section 2 of Class I itself; allowing that the non-specific, simply inflammatory affection may be attended with the formation of false membranes even on the fauces. Such a view does away with the very improbable supposition that laryngeal diphtheria differs from the ordinary form of the disease in being peculiar to children, and in possessing little or no infectiousnesss; and I think that it commends itself to us on other grounds also."

Dr. Fagge's Cases.

Class I.—*False membrane in larynx and trachea.*

Sex.—Males, 15. Females, 20=35.

Age.—

1–2 years.	2–3.	3–4.	4–5.	5–6.	7.	10½.	16.	18.	24.	26.
6	7	3	7	2	1	1	1	1	1	1

34.	41.	42.
2	1	1=35.

Time of year (month of admission):

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	1	4	3	1	1	4	6	5	5

Nov.	Dec.
3	1.

Ætiology:

Other cases of diphtheria in neighbourhood, 5.
Contracted in hospital, 3; gave the disease to other patients, 2.
Catching cold, 1; measles + scarlatina, 1.
No data, 23.

Earliest local symptoms:

Sore throat, 2.
Croupy cough, hoarseness, dyspnœa, 10.
Sore throat + laryngeal symptoms together, 1.
Coryza and febrile symptoms, 3.
No data, 19.

Time of onset of laryngeal symptoms.

Tracheotomy, 24.

Albuminuria:

Present, 8.
Absent, as often as examined, 1.
No data, 26.

Result:

Died, 32.
Recovered, 2.
Not known, 1.

Class II.—*False membrane in air-passages alone.*

Sex.—Males, 10. Females, 8. Not stated, 1=19.

Age.—

1–2.	2–3.	3–4.	4–5.	5–6.	6–7.	
7	6	2	1	2	0	Not stated, 1=19.

Time of year:

Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
4	0	3	0	1	3	2	1	1	2

Nov.	Dec.	
1	1	=19.

Ætiology:

Exposure to cold, 4.
Contracted in hospital, 0.
Diphtheria in neighbourhood, 0.
No data, 15.

Earliest local symptoms:

Sore throat.
Laryngeal, 6.

Coryza, 2.
No data, 10.

Time of onset of laryngeal symptoms.

Tracheotomy, 15.

Albuminuria:

Present, 0.
Not present, 2.
No data, 17.

Result:

All fatal.

APPENDIX VII.

DR. GEE'S TABLES.

CLASS 1.—*Cases of membranous laryngitis associated with a similar condition of the fauces. Hospital for Sick Children from* 1853 *onwards.*

Dr. Buchanan's Case-book.						
23.	. .	Hannah Lovibond.	2 years.	Death.		Alb.
24.	. .	Alice Johnson.	1¾ „	„		No alb.
Dr. Hillier's Case-books.						
25.	Vol. i, p. 481.	"Dr. Babington's case."		„	p.m.	No alb.
26.	328.	Florence Keyte.	2 years.	„	„	?
27.	446.	Thomas Ryan.	2 „	„	„	?
28.	Vol. iii, p. 55.	Edward Gibbons.	3 „	„	„	?
29.	79.	Alfred Bransgrove.	4 „	„	„	?
30.	59.	Mary Griffin.	4½ „	Recovered. (Membrane expectorated.)		Alb.
31.	212.	M. Little.	2 years.	Death.	p.m.	?
32.	74.	John Lane.	3 „	„	„	Alb.
33.	Vol. iv, p. 152.	William Smeaton.	2 „	„	„	„
34.	176.	Frances Shiel.	8 „	„	„	„
35.	170.	Lydia Grimbley.	4 „	„	„	„
36.	186.	Ellen Groom.	3¾ „	„	„	„
37.	158.	Frederick Vihw.	2½ „	„	„	„
38.	Vol. v, p. 173.	Joseph Wing.	5 „	„	„	„
39.	167.	Mary Stanning.	3¼ „	„	„	„
40.	Vol. vi, p. 44.	Anne Gee.	1¾ „	„	„	?
41.	Vol. vii, p. 184.	Theresa Durham.	2¾ „	„	„	Alb.
42.	218.	Louisa Bird.	3 „	„	„	„
Dr. West's Case-books.						
1.	Vol. i, p. 59.	F. Hackney.	6 „	„	„	?
2.	469.	James Walton.	3 „	„	„	?
3.	325.	Thomas Vose.	3 „	„	„	?
4.	71.	Bridget Buckley.	5 „	„	No p.m. (Membrane expectorated.)	?
5.	241.	Emily Carpenter.	5 years.	Death.	p.m.	?
6.	Vol, ii, p. 343.	John Jones.	2¾ „	„	„	?

7.	Vol. iii, p. 23.	Elizabeth Duckett.	2 years.	Death.	p.m.	?
8.	357.	Flora Cogswell.	$2\frac{5}{6}$ „	„	„	Alb.
9.	Vol. v, p. 91.	Emily Walker.	$4\frac{3}{4}$ „	„	„	„
10.	115.	Clara Cook.	5 „	„	„	„
11.	Vol. vi, p. 81.	Maria Cracknell.	2 „	„	„	„
12.	241.	Frederick Freeth.	$3\frac{1}{6}$ „	„	„	No alb.
13.	319.	Charles Winton.	5 „	„	„	?
14.	15.	Henrietta Esterby.	3 „	„	„	Alb.
15.	73.	John Harker.	6 „	„	„	„
16.	Vol. vii, p. 37.	Henry Norton.	$2\frac{1}{4}$ „	„	„	?
17.	361.	Florence Ralph.	$4\frac{1}{2}$ „	„	„	Alb.
18.	1.	Florence Stowe.	$1\frac{5}{6}$ „	„	„	„
19.	Vol. ix, p. 171.	Janet Murphy.	$2\frac{1}{3}$ „	„	„	?
20.	411.	John Hope.	2 „	„	„	?
21.	345.	Elizabeth Wright.	$3\frac{1}{2}$ „	„	„	?
22.	Vol. x, p. 135.	Charles Conroy.	13 months.	„	„	?

CLASS 2.—*Cases of membranous laryngitis not associated with a similar condition of the fauces.*

Dr. Hillier's Case-books.

1.	Vol. iv, p. 156.	M. Huggins.	5 years.	Death.	p.m.	Alb.
2.	Vol. v, p. 182.	George Miller.	$1\frac{1}{2}$ „	„	„	?
3.	184.	Gertrude Fachler.	6 „	Recovery. (Membrane expectorated.)		
4.	Vol. vi, p. 31.	Elizabeth Bass.	5 years.	Death.	p.m.	?
5.	48.	Elizth. McCarthy.	4 „	„	No p.m.	Alb. (Membrane expectorated.)

Dr. West's Case-books.

	Vol. iii, p. 41.	William Gray.	$2\frac{3}{4}$ years.	Death.	p.m.	?
6.	Vol. i, p. 51.	J. G. Cassaigne.	$11\frac{1}{2}$ „	„	„	?
7.	543.	Edward Dolman.	3 „	„	„	?
8.	559.	Henry Hoare.	5 „	„	„	Alb.
9.	Vol. ii, p. 29.	Emma Manley.	$1\frac{1}{12}$ „	„	„	?
10.	Vol. iii, p. 385.	John Knight.	$2\frac{1}{3}$ „	„	„	?
11.	445.	Mary Stacey.	7 „	„	„	No alb.
12.	109.	Charlotte Holmes.	3 „	„	„	?
13.	Vol. iv, p. 471.	Caroline Huggard.	$5\frac{1}{2}$ „	„	„	Alb.
14.	241.	George Lepine.	$2\frac{2}{3}$ „	„	„	„
15.	Vol. vi, p. 165.	Fanny Smith.	4 „	Recovered. (False membrane expectorated.)		„
16.	545.	Fred. Norman.	5 years.	Death.	p.m.	„
17.	Vol. vii, p. 147.	Mary Connor.	4 „	„	„	?

18. Vol. viii, p. 95.	Alfred Bunn.	3⅓	years.	Death.	p.m.	No alb.
19. 141.	Hattie Fairbank.	4	„	„	„	?
20. Vol. ix, p. 209.	Fred. Allwright.	3½	„	„	„	?
21. Vol. xi, p. 163.	Thomas Brown.	2½	„	„	„	?

(Doubtful case.)

Class 3.—*Cases of acute laryngitis, whether catarrhal or membranous unknown.*

Dr. Hillier's Case-books.

Vol. i, p. 336.	Henry Sylvester.	9 years. Recovered. Alb. (Membrane on fauces.)
414.	William Wilcox.	2⅓ years. Recovered. (Membrane on fauces.)
497.	Timothy Collinson.	4 years. Recovered. (No membrane seen.)
Vol. ii, p. 212.	James Martin.	4 years. Recovered. (Membrane on fauces.)
Vol. iii, p. 78.	Mary Lane.	1¾ years. Died. p.m.? (Membrane on fauces,)
84.	Alice Randal.	19 months. Recovered.) (No membrane seen.)
Vol. v, p. 190.	John Wiggins.	5½ years. Recovered. (No membrane seen.)
Vol. vii, p. 34.	Benjamin Thomas.	5¾ years. Recovered. (No membrane seen.)

Dr. West's Case-books.

Vol. i, p. 91.	Richard Smith.	1½ years. Recovered. (No membrane seen.
163.	Edwin Grant.	5 years. Recovered. (Membrane on fauces.)
417.	George Coader.	4 years. Recovered. (Membrane on fauces.)
Vol. ii, p. 309.	Eliza Brough.	2½ years. Recovered. (Membrane on fauces.)
445.	Matilda Pike.	1¾ years. Recovered. (No membrane seen.)
357.	Arthur Fortune.	2⅓ years. Recovered. (Membrane on fauces.)
Vol. iv, p. 493.	Walter Dunkin.	5 years. Recovered. (No membrane seen.)

Vol. iv, p. 97.	Thomas Antony.	2 years. Died. p.m. (Membrane on fauces, died late on.)
Vol. v, p. 127.	Mary Lucas.	3 years. Died. No p.m. (Membrane on fauces.)
Vol. vi, p. 161.	Edward Wells.	3 years. Recovered. (No membrane seen.)
Vol. vii, p. 321.	Sarah Saunders.	4 years. Recovered. (No membrane seen.)
Vol. viii, p. 153.	William Timpin.	$2\frac{5}{12}$ years. Recovered. (No membrane seen.)
367.	Kate Peters.	$5\frac{1}{3}$ years. Recovered. (No membrane seen.)
Vol. ix, p. 375.	Sarah Blake.	$3\frac{1}{4}$ years. Recovered. (No membrane seen.)
415.	John Hines.	5 years. Recovered. (Membrane on fauces.)
Vol. x, p. 569.	Jos. Blackborough.	7 years. Recovered. (No membrane seen.)

CLASS 1.—*Cases of membranous laryngitis,*

No.	Date of admission.	Ætiology.	First symptom of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.
1	Sept. 28, 1858	Father and brother had same disease	Sore throat, Sep. 26	Sept. 28 (admission)	Oct. 4
2	June 21, 1861	No data	Croupy cough, June 18	Not during life	From first
3	Mar. 26, 1861	Ditto	Ill, Mar. 17; sore throat, Mar. 20	Tonsils, pharynx; on admission	Mar. 24
4	Mar. 1, 1859	Ditto	Ill, Feb. 27; dyspnœa, Feb. 28	Tonsils; "slight whitish deposit"	Feb. 28
5	Jan. 20, 1861	Contracted in hospital. Abscess in thigh; rheumatism ? pleurisy and pericarditis; acute nephritis (Jan. 22); erysipelas of thigh, Jan. 24	Croupy cough, Jan. 31	No note	Jan. 21
6	Oct. 18, 1861	Contracted in hospital. Tubercular meningitis; "diphtheria prevalent in ward"	Sore throat, Oct. 27	Ditto	None
7	Feb. 6, 1862	Contracted in hospital. Polyuria; scarlet fever, Feb. 23	Swallowing and breathing difficult Mar. 17,	None seen	From first
8	Dec. 8, 1862	Sister had diphtheria afterwards	Sore throat, Dec. 3	Child not seen during life	Dyspnœa, Dec.
9	July 30, 1863	Contracted in hospital. Febricula, July 28	Sore throat, Aug. 8	Tonsils, Aug. 8	Croupy breat 8 hours afte sore throat
10	Aug. 11, 1863	A child living in same house had diphtheria	"Slight cold," Aug. 6; sore throat, Aug. 7	Tonsils, pharynx; on admission	Croupy breath ing, Aug. 10
11	Apr. 16, 1864	Attributed by mother to going out insufficiently clothed	"Cold on chest," Apr. 13; croupy cough, Apr. 15	A few white specks on tonsils; no false membrane until Apr. 17	Apr. 15
12	Sept. 5, 1864	Nothing discoverable	Febrile, Aug. 31; croupy breathing, Sept. 3	Sore throat, Sept. 4; no false membrane on admission	Sept. 3
13	Nov. 19, 1864	Cough 2 weeks, when after a walk became much worse; croupy	Slight cough, Nov. 4; croupy cough, Nov. 18,	Specks on tonsils	Nov. 18

ssociated with a similar condition of fauces.

Trache-otomy.	Urine.	Result.	Post-mortem examination.		Remarks.
			Resp. fauces.	Resp. larynx.	
No	No note	Death, Oct. 13, apnœa	Tonsils, soft palate, pharynx	Lined with false memb.	
No	Ditto	Death, June 23, apnœa	Tonsils, pharynx	Ditto.	
Mar. 29	No albumen on Mar. 27	Death, Mar. 30	Ditto	Ditto.	
Mar. 1	No note	Death, Mar. 2	No examination, but false membrane extracted from tracheotomy wound.		
No	Albuminuria preceded croup	Death, Feb. 1, apnœa	Pharynx	Lined with false memb.	
No	No note	Death, Oct. 28	Tonsils, soft palate, pharynx	Ditto.	
No	Trace of albumen, Mar. 17 (no albumen, Mar. 13)	Death, Mar. 17, apnœa	Tonsils, uvula	Ditto.	
No	Urine highly albuminous	Death, Dec. 8, apnœa	Soft palate, pharynx, nasal fossæ, stomach	Ditto.	
No	Albuminous, Aug. 11	Death, Aug. 11, apnœa	Tonsils, uvula	Ditto.	
Aug. 11	Highly albuminous, Aug. 11	Death, Aug. 12, preceded by convulsions	Tonsils, soft palate	Ditto.	
Apr. 17	None obtainable; probably scanty. Highly albuminous after death	Death, Apr. 18	Tonsils, uvula	Ditto	False membrane expectorated after tracheotomy.
Sept. 5	Slightly albuminous just before death only	Death, Sept. 7	Tonsils, distinct false membrane	Ditto.	
Nov. 20	No note (kidneys natural)	Death, Nov. 21	Tonsils, root of tongue, distinct false membrane	Ditto	False membrane expectorated after tracheotomy.

No.	Date of admission.	Ætiology.	First symptom of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.
14	Mar. 13, 1865	No data	Sore throat, difficult breathing, Mar. 10	Tonsils, pharynx	Not marked until Mar. 14
15	Apr. 7, 1864	Contracted in hospital. Scarlet fever, Mar. 17; renal dropsy, Apr. 1	Laryngeal dyspnœa, Apr. 15	Nothing seen	Apr. 15
16	Jan. 24, 1866	Measles, rash, Jan. 16	Croupy cough, Jan. 23	White patch on right tonsil	From the first
17	Nov. 4, 1866	Attributed to cold after moving; subject to sore throat and hoarseness	Lassitude, Oct. 31; sore throat, Nov. 1	Tonsils and uvula covered with false membrane Nov. 3	Hoarse breathing, Nov. 3
18	Jan. 4, 1866	No data	Croupy cough, Dec. 27, 1865	No false membrane seen	From the first
19	Mar. 25, 1868	Old caries of spine; scrofulous child	Slight cough, Mar. 23	Not examined	Husky breathing, Mar. 28
20	Oct. 14, 1868	No data; cough, Oct. 7	Short breath, Oct. 12	Tonsils, false membrane	Oct. 12 ?
21	Aug. 4, 1868	No data	Lassitude, Aug. 1; lost voice, Aug. 2	No note	Aug. 2
22	Apr. 28, 1869	No data; "cold," Apr. 18	Dyspnœa, Apr. 25	Ditto	Apr. 25
23	Oct. 6, 1868	No data	Coryza, Oct. 2	Nothing seen	Oct. 4
24	Dec. 5, 1868	No data; occasional hoarseness, 6 days	Dyspnœa, Dec. 2	No note	"Laryngeal" breathing, Dec. 4
25	Nov. 3, ?	No data	No data	False membrane seen on tonsils	"Laryngeal symptoms," Nov. 3
26	Nov. 4, 1861	"Wheezing at chest," 14 days; cousin said to be suffering from croup; children met 5 days before, Nov. 2	Breathing noisy and difficult, Nov. 2	False membrane, tonsils, uvula, soft palate	Nov. 2
27	Mar. 7, 1861	No data	Febrile, March 2; dyspnœa, Mar. 3	Fauces, uvula, tonsils	Mar. 3
28	Aug. 12, 1862	Ditto	Loss of voice, Aug. 10	Tonsils, false membrane	From first
29	July 30, 1862	Ditto	"Roughness in breathing," July 26	No note	Ditto
30	Sept. 9, 1862	Child in same house died of "croup" on Aug. 30. Child in opposite house died of "croup" on Sept. 2	Difficult breathing, Sept. 5	Tonsils, uvula, soft palate, pharynx	Ditto

Trache-otomy.	Urine.	Result.	Post-mortem examination.		Remarks.
			Resp. fauces.	Resp. larynx.	
No	Notably albuminous	Death, Mar. 15	Tonsils, soft palate, posterior nares	Lined with false memb.	
No	Albuminuria preceded croup	Death, Apr. 17, apnœa	Soft palate, posterior nares	Ditto.	
No	Urine not obtained	Death, Jan. 25, asthenia	Right tonsil, patch of false membrane	Ditto	A wretched rickety child.
Nov. 5	Nov. 5, no albumen; Nov. 6, slight albumen; Nov. 7—11, abundant albumen	Death, Nov. 11	No false membrane	No false membrane	False membrane repeatedly expectorated.
No	Albumen very abundant	Death, Jan. 5, asthenia	Left tonsil, arytenoid, epiglottic folds, tough false memb.	Lined with false memb.	
No	No note	Death, Mar. 29, apnœa	Uvula, pharynx	Ditto.	
No	No urine obtained	Death, Oct. 14, asthenia	Tonsils, thick false membrane	Ditto.	
Aug. 4	Slightly albuminous	Death, Aug. 5	Tonsils, uvula, soft palate	Ditto.	
No	No note	Death, Apr. 28	Tonsils, soft palate	Ditto	Lobar pneumonia ight lung
Oct. 6	Albuminous	Death, Oct. 10	"A little false membrane on tonsils"	Ditto.	
Dec. 5	No albumen in urine	Death, Dec. 15	"False membrane on tonsils"	Ditto.	
Nov. 3	No albumen	Death, Nov. 4	No false membrane	Ditto.	
No	No note	Death, Nov. 5, apnœa	Tonsils, uvula, soft palate, posterior nares	Ditto.	
Mar. 7	Ditto	Death, Mar. 8, apnœa	Tonsils, false membrane	Ditto.	
No	Ditto	Death, Aug. 16, apnœa	False membrane both tonsils	Ditto.	
uly 30	Ditto	Death, July 31, apnœa	Tough exudation on tonsils	Ditto	False membrane expectorated after tracheotomy.
ept. 9	A little albumen	Recovery	—	—	No sequelæ, Feb., 1863, was quite well.

No.	Date of admission.	Ætiology.	First symptom of diphtheria.	Membrane seen on fauces.	Laryngeal symptoms.
31	June 19, 1862	Brother died of diphtheria June 18. Mother, false membrane on tonsils and soft palate, June. 20. Recovered	Lassitude, June 13	Tonsils, June 14	Laryngeal symptoms, June 22
32	Aug. 29, 1862	No data	Lassitude, Aug. 27; cough, Aug. 29	Tonsils, fauces, Aug. 29	Aug. 29
33	Aug. 11, 1863	No diphtheria known in neighbourhood	Throat sore, July 21; dyspnœa, Aug. 9	Tonsils	Aug. 9
34	July 20, 1863	One child died 2 months ago of "diphtheria"	Lassitude, July 15; croupy cough, July 18	Ditto	July 18
35	Apr. 19, 1863	No diphtheria known in house	Lassitude, Apr. 10; cough; dyspnœa, Apr. 16	Tonsils, patch of exudation on both	Croupy cough, Apr. 18
36	June 25, 1863	No data	Cough, June 15; dyspnœa, June 22	No note	Breathing hoarse, June 22
37	Feb. 19, 1863	No diphtheria known in neighbourhood	Coryza, Feb. 17	Tonsils, soft palate, pharynx	Croupy cough, Feb. 18
38	June 15, 1864	Ditto	Lassitude, June 8; sore throat, June 12	Tonsils, thick exudation	Husky voice, June 15
39	July 13, 1864	No data	"Throat swollen," July 7	Tonsils, exudation	Croupy cough, July 8
40	Aug. 31, 1865	Ditto	Throat sore, Aug. 30	Fauces covered with false membrane	None
41	June 6, 1868	Ditto	Lassitude, May 31; sore throat, June 3	Tonsils and posterior pharynx	Dyspnœa, June 5
42	June 29, 1868	Ditto	Febrile, June 19; neck swollen, June 20	Tonsils, false membrane	Husky breathing, June 26

Trache-otomy.	Urine.	Result.	Post-mortem examination.		Remarks.
			Resp. fauces.	Resp. larynx.	
No	Very albuminous	Death, June 23, apnœa	No post mortem		Private patient.
Sept. 1	Ditto	Death, Sept. 3, apnœa	Tonsils, pharynx, false membrane	Lined with false memb.	
No	No note	Death, Aug. 13, asthenia	Tonsils, uvula, soft palate, false membrane	Ditto.	
July 21	Highly albuminous	Death, July 28	Tonsils, soft palate, false membrane	Ditto	False membrane expectorated after tracheotomy.
Apr. 19	Very albuminous	Death, Apr. 22	No false membrane	Ditto.	
June 25	Decidedly albuminous	Death, June 26	Tough exudation on each tonsil	Ditto.	
Feb. 20	Urine albuminous after death	Death, Feb. 20	Tonsils, soft palate, pharynx, false membrane	Ditto.	
June 16	Notably albuminous	Death, June 18	No false membrane	Ditto.	
July 13	Ditto	Death, July 14	Tonsils, uvula, false membrane	Ditto.	
No	None obtained	Death, Sept. 1	Tonsils, soft palate, false membrane	No false membrane in rima glottidis, not much below arytenoids.	
June 6	Very albuminous	Death, June 6, apnœa	Tonsils, soft palate, pharynx, false membrane	Lined with false memb.	
July 1	Highly albuminous	Death, July 1	Tonsils, false membrane	Ditto.	

Class 2.—*Cases of Membranous Laryngitis*

No.	Date of admission.	Ætiology.	First symptom of disease.	Membrane seen on fauces.	Laryngeal symptoms.
1	Mar. 3, 1863	No data	Laryngeal	None	Hoarse, Mar. 2
2	Nov. 2, 1864	Oct. 29, exposed in street to a cold wind; became hoarse same night	Ditto	Ditto	Hoarse, Oct. 29
3	Oct. 21, 1864	No data	Ditto	Ditto	Hoarse, Oct. 9
4	Nov. 17, 1865	Ditto	Cough, 3 weeks; hoarse, Nov. 12	Ditto	Hoarse, Nov. 12
5	Sept. 20, 1865	H oong-cough for two months before croup. Child ill in house with sore throat (supposed scarlet fever)	Laryngeal	None seen during life	Hoarse, Sept. 19
6	Private patient	Scarlet fever in house	Lassitude, Mar. 14; sore throat	Ditto	Croupy cough, Mar. 19
7	Sept. 10, 1861	No data. Croup occurred while in hospital for dropsy, probably scarlatinal	Feverish, Sept. 8; dropsy, Sept. 9 (albuminuria)	Ditto	"Tracheal breathing," Sept. 12
8	Sept. 19, 1861	Scarlet fever, Aug. 29; dropsy, Sept. 12	—	Ditto	"Tracheal breathing," Oct. 8
9	Jan. 30, 1861	In hospital for spina bifida	Laryngeal cough, Mar. 7	Ditto	Laryngeal cough
10	May 9, 1862	Subject to laryngismus stridulus; rickets	"Stridulous breathing," May 7	Ditto	Stridulous breathing
11	May 23, 1862	"Tracheitis," with symptoms of croup; in hospital from Mar. 4 to Mar. 23, 1862; went out well, and kept so until May 20	Feverish, May 20; headache, delirium. No croupy symptoms noted before admission	Ditto	Breathing tracheal, May 23
12	Feb. 20, 1862	Croup supervened in hospital on 12th day of typhoid fever	Throat sore, Feb. 27; hoarse breathing	Natural	Hoarse breathing, Feb. 27
13	Mar. 3, 1863	Supposed to have caught cold on Mar. 1. Went to a warm church, and then had half an hour's walk home in the cold; forgot to fasten cloak. No diphtheria in neighbourhood	Hoarse voice, same evening; violent, Mar. 1	None	From the first

not associated with a similar condition of fauces.

rache-otomy.	Urine.	Result.	Post-mortem examination.		Remarks.
			Resp. fauces.	Resp. larynx.	
ar. 3	Albuminuria	Death, Mar. 19	Natural	Filled with false membrane.	
No	Urine not obtained	Death, Nov. 3	Ditto	Ditto.	
t. 21	Albuminous	Recovery	—	—	False memb. expectorated after trache-otomy.
v. 17	None obtained	Death, Nov. 18	Natural	Ditto.	
ot. 20	Notably albumin-ous	Death, Oct. 2	No post mortem	—	False memb. expectorated after trache-otomy.
r. 21	No note	Death, Mar. 23	Natural	Filled with false membrane.	
No	(Renal dropsy)	Death, Sept. 15	Ditto	No true false membrane, but a thin layer of thick mucus in air-tubes	No pleural effu-sion noted.
No	Ditto	Death, Oct. 10	Ditto	Lined with false membrane	False memb. expectorated, Oct. 10.
No	No note	Death, Mar. 9	Red and con-gested	Ditto.	
No	Ditto	Death, May 9	Natural	Ditto.	
y 24	No albumen	Death, May 27	Ditto	Ditto.	
No	Ditto	Death, Mar. 1	Tonsils "ulcer-ated;" no false memb.	Ditto.	
ar. 3	Albumen appeared Mar. 9, and re-mained till death	Death, Mar. 19	Natural	Broken-up exu-dation.	

No.	Date of admission.	Ætiology.	First symptom of disease.	Membrane seen on fauces.	Laryngeal symptoms
14	Oct. 28, 1862	Acquired in hospital. Under treatment for pneumonia	Nasal discharge, Nov. 7	None	"Croupy" cough Nov. 12
15	Nov. 16, 1863	No data	Seemed to have a bad cold, Nov. 9	Ditto	Croupy breathing. Nov. 15
16	Nov. 1, 1865	Ditto	Cough, 1 week; voice hoarse, Oct. 29	Ditto	Hoarseness, Oct. 29
17	Apr. 5, 1866	Ditto	Hoarseness, Apr. 4	Ditto	Hoarseness, Apr. 4
18	Apr. 8, 1867	Measles rash, Mar. 27	Dyspnœa, Apr. 2	—	From Apr. 2
19	June 20, 1867	No data	No data	None	Present on admission
20	Apr. 17, 1868	"Croup," 2 years ago, several attacks since	Febrile, Apr. 2	Ditto	Dyspnœa, Apr. 5
21	Apr. 2, 1870	No data	Noisy breathing, Mar. 30	Ditto	From Mar. 30

Trache-otomy.	Urine.	Result.	Post-mortem examination.		Remarks.
			Resp. fauces.	Resp. larynx.	
No	Albumen appeared Nov. 14	Death, Nov. 19	Natural	Broken-up exudation	Double pneumonia.
Nov. 19	Slight albumen, Nov. 19	Recovery	—	—	A little false memb. expectorated.
Nov. 1	Slight albumen, Nov. 3	Death, Nov. 3	No post mortem examination	False membrane in trachea; larynx not examined	False memb. expectorated after trache-otomy.
No	No albumen	Death, Apr. 7	No false membrane	False membrane below true cords.	
No	Ditto	Death, Apr. 13	Natural	Lined with false membrane.	
No	No note	Death, June 25	No note	Ditto.	
Apr. 17	No albumen on Apr. 18	Death, Apr. 24	Natural	Ditto (thick false membrane)	Pneumonia.
Apr. 9	No albumen on Apr. 4	Death, Apr. 10	—	Larynx much reddened; "what seemed to be soft exudation" in trachea.	

Class I.—*False membrane in larynx and fauces.*

Sex.—Males, 18. Females, 23. Not said, 1 = 42 cases.

Age.—

	From 1 to 2 years.	2—3.	3—4.	4—5.	5—6.	6.	
Males	1	7	5	1	2	2	0 = 18
Females	3	7	5	4	3	0	1 = 23
Not said = 1							1
							42

Time of year.—Month of admission to hospital :

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
3	2	5	4	0	6	4	6	3	3	4	2	= 42

Ætiology :

Other cases of diphtheria in neighbourhood	= 7	12
Contracted in hospital	= 5	
Supposed due to catching cold	= 3	
No data	= 27	

Earliest local symptom of diphtheria :

Sore throat	14
Croupy cough, hoarseness, or dyspnœa	23
Sore throat and laryngeal symptoms simultaneous	2
Coryza	2
No data	

Time of onset of laryngeal symptoms :

Day of disease	1	2	3	4	5	6	7	No data.
Cases	16	4	4	3	3	1	1	5

Tracheotomy.—23 times and 1 recovery.

Albuminuria.—

Old nephritis before croup	2
Present during life	20
Urine not obtained during life; albuminuria after death	2
Not albuminous so often as examined	3
No data	15

Results.—

Died	18 males.	22 females.	1 unknown sex	= 41 deaths.
Recovered	0 „	1 „	0 „	= 1 recovery.

Class II.—*False membrane in larynx; not in fauces.*

Sex.—Males, 10. Females, 11 = 21 cases.

Age.—From	1 to 2.	2—3.	3—4.	4—5.	5—6.	6.	7.	11.	
Males .	1	3	3	0	2	0	0	1	= 10
Females	1	0	1	4	3	1	1	0	= 1
									21

Time of year.—Admission:

Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	
1	1	3	4	2	1	0	0	3	2	4	0	= 21

Ætiology:

Attributed to exposure to cold = 2 No data = 8
Contracted in hospital . . = 4
Diphtheria in neighbourhood . = none said to be so.
Second attack of "croup" in 2. During measles = 1. During hooping cough = 1 During scarlatinal dropsy = 2. During typhoid fever = 1. Scarlet fever in house = 2.

Earliest local symptom of disease:

Sore throat	1
Laryngeal	17
Both at same time	1
Coryza	1
No data	1

Some of onset of laryngeal symptoms:

Day of disease	1	4	6	Doubtful.
Cases	15	2	2	2

Tracheotomy.—11 times and 2 recoveries.

Albuminuria.—Old nephritis before croup 2
Present during life 7
Not present so often as examined 6
No data 6

Results.—Died 19
Recovered . . . . . 2, both females.

APPENDIX VII.

REPORTS TO THE MEDICAL OFFICERS OF THE PRIVY COUNCIL AND LOCAL GOVERNMENT BOARD.

The following is a list of the principal Reports made to the Medical Officers of the Privy Council and Local Government Board with reference to outbreaks of diphtheria, or having some bearing upon the subject. Through the kindness of Dr. Buchanan the Committee have had access to these reports, and reference has been made to them upon several important points in the history of diphtheria.

It was intended to append a digest of these reports to the Report of the Committee, but as the greater part of them have been published, it is thought that it will be sufficient to give a list of the more important for purposes of reference, and that this will be of value in future work upon the subject. The majority of these reports have, moreover, no special reference to the relations of diphtheria and croup, the facts brought out in them upon this point arising only incidentally.

List of Reports.

1860.—Second Report of the Medical Officer of the Privy Council Reports of Dr. Greenhow and Dr. Sanderson on Diphtheria.

1871.—Dr. Homf, 'Outbreak of Diphtheria at Newton Valence, Hampshire.'

Dr. Gwynne Harries, 'Diphtheria in Porlock, Luccombe, and Selworthy.'

1872.—Dr. Home, 'Diphtheria in Charles Registration Subdistrict of Plymouth.'

Dr. Gwynne Harries, 'Sanitary Arrangements of Villages in Worksop Union.'

Dr. Airy, 'Diphtheria in Longbenton Subdistrict.'

Dr. Thorne Thorne, 'Outbreak of Diphtheria at Andover.'

Dr. Thorne Thorne, 'Diphtheria at Great Milton (Thame Union).'

Goodall 13/3/26

1. Membranous Croup

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