

Croup and tracheotomy in the City of Brooklyn, State of New York : a study of local conditions and local experience, with map showing location of croup areas in that city : a report made to the Medical Society of the County of Kings, N.Y., April 17th, 1877 / by Lewis S. Pilcher.

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MAP
to accompany Report of Dr. Pilcher
on Croup and Tracheotomy
in the City of Brooklyn, N.Y.

8

CROUP AND TRACHEOTOMY

IN THE

CITY OF BROOKLYN,

STATE OF NEW YORK.

A STUDY OF LOCAL CONDITIONS AND LOCAL EXPERIENCE, WITH MAP SHOWING
LOCATION OF CROUP AREAS IN THAT CITY.

A REPORT

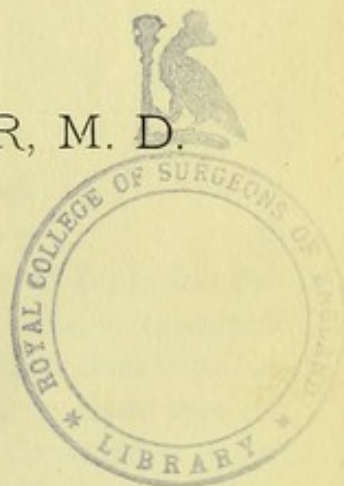
MADE TO THE MEDICAL SOCIETY OF THE COUNTY OF KINGS, N. Y.
APRIL 17TH, 1877,

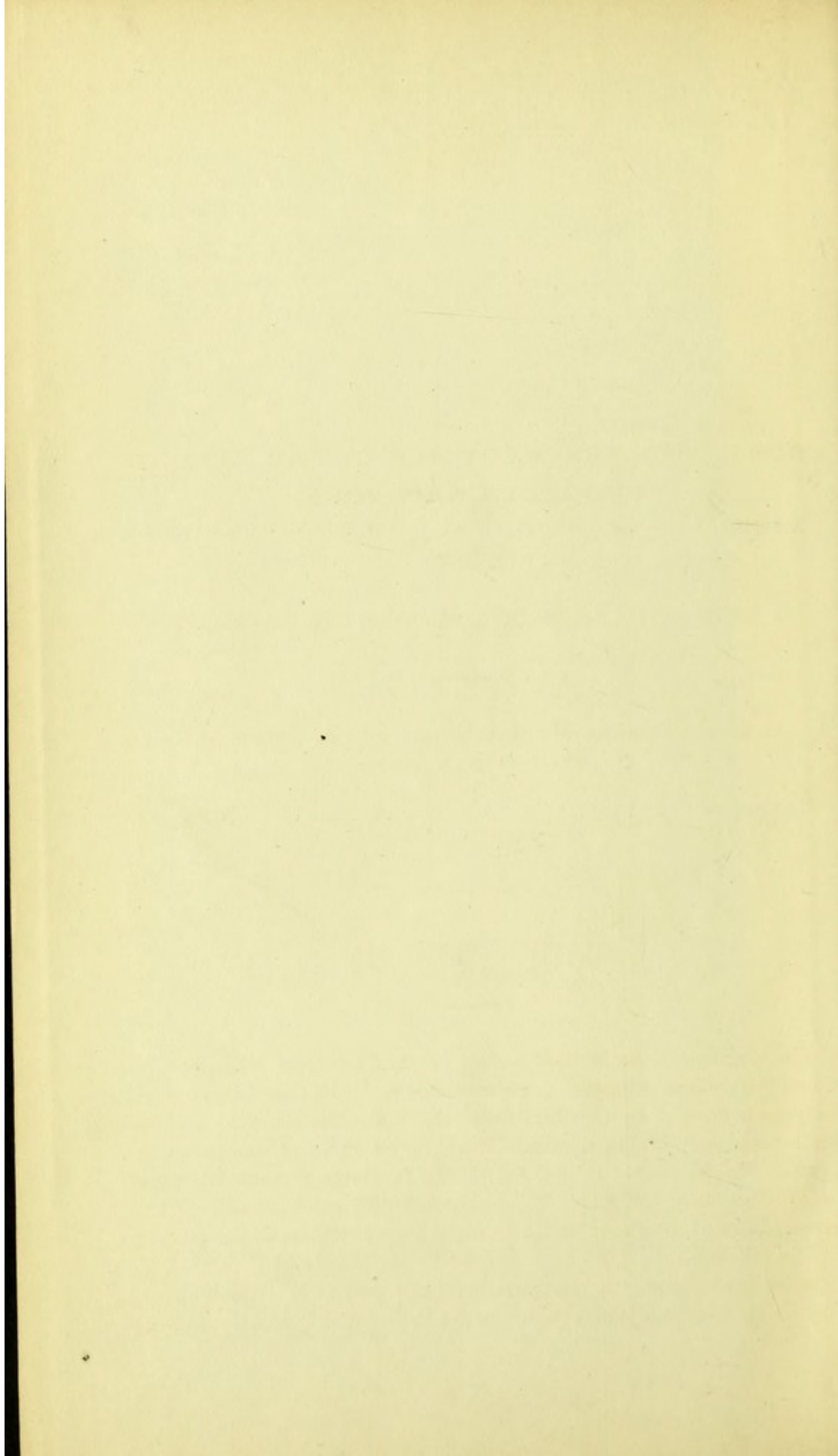
BY LEWIS S. PILCHER, M. D.

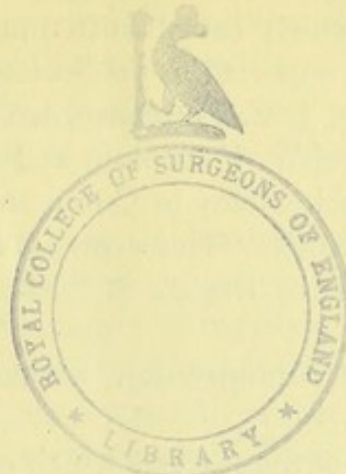
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CROUP AND TRACHEOTOMY IN THE CITY OF
BROOKLYN, NEW YORK.

A STUDY OF LOCAL CONDITIONS AND LOCAL EXPERIENCE.

A REPORT MADE TO THE MEDICAL SOCIETY OF THE COUNTY OF KINGS,
STATE OF NEW YORK,

APRIL 17TH, 1877.

BY LEWIS S. PILCHER, M.D.

The attention of the Medical Society of the County of Kings has frequently been directed to the examination of croup in some of its aspects in recent years. In October, 1862, Dr. Wm. Gilfillan read a paper on Tracheotomy in Diphtheritic Croup, in which three cases were reported. In November, 1869, Dr. J. H. H. Burge presented a paper on the Treatment of Croup. This paper attracted much attention. The views advanced in it have, to a very large degree, influenced the practice of the profession in this city ever since. In March, 1871, Dr. O. C. Sparrow read a paper on the Pathology of Croup. In March, 1874, Dr. C. H. Giberson read a paper on the Differential Diagnosis of Croup

and Diphtheria, which called forth much discussion. In May, 1875, Dr. A. W. Catlin reported to the Society a successful case of tracheotomy in croup, Dr. J. C. Hutchison having been the operator. In September, 1875, Drs. W. F. Sanford and F. W. Rockwell read papers on the subject of Tracheotomy in Croup and Diphtheria, in which successful cases were detailed. The same subject was continued in October, 1875, when papers by Drs. L. S. Pilcher and H. J. Garrigues were presented.

This report, in its preparation, has naturally divided itself into three parts, viz. :

First. A study of the features which croup presents in Brooklyn.

Second. A study of the results of tracheotomy for croup, as done in Brooklyn.

Third. Such conclusions as an examination of the facts elicited, in their relations to each other, shall seem to warrant.

The term croup is used in this report in a comprehensive sense, as including all forms of acute inflammatory disease of the larynx or trachea, which may produce narrowing of their calibre to such an extent as to occasion serious prolonged dyspnoea.

An examination of nearly three thousand certificates of death, given in this city during the seven years last past, in which death has been attributed to various forms of croup, has shown that great confusion and uncertainty exists in the use of terms indicating the differing pathological conditions which may be present in croup, using the word as stated above. The terms laryngitis or tracheitis simply are often used where the affection has undoubtedly been one attended with membranous exudation; the term membranous croup is still more frequently used where the exudation has been diphtheritic in character; cases of catarrhal laryngitis and of œdema glottidis are recorded as cases of membranous disease.

The attempts made, in the official registry of diseases, to distribute fatal cases of croup under the headings adopted of Croup, Diphtheria and Acute Laryngitis are totally unreliable and calculated to mislead. These records abundantly sustain, from the clinical stand-point of the general practitioner, the assertion from the laboratory of the histologist, "*that there is no sharp dividing line between diphtheria and croup.*"* Many of us, puzzled as to the diagnosis of a given case, will feel grateful for the sympathetic assertion of the German professor, "that it is not always easy during life to make a clear diagnosis" between true croup and

* Wagner, quoted by Steiner—Ziemssen's Cyclopædia Prac. Med., vol. iv, p. 257—article on Croup.

the croup of diphtheria.*† As regards the various diseases included under the general title of croup, the one point in common possessed by them, which compels their classification together in this inquiry, is the possibility of the occurrence of dangerous dyspnoea, demanding tracheotomy for its relief.

In the preparation of this report, a special examination of the records of the Board of Health, during the years 1870 to 1876 inclusive, has been made. This required the inspection of over 80,000 certificates of death. Records of 2,769 fatal cases of croup†, occurring within the period mentioned, have been collected from this source. An abstract of the certificate of death in each case was made. From the careful digestion of this material much of interest has been obtained.

* As a striking illustration of this fact, during the past seven years, in the city of Brooklyn, in sixty-two different instances have two or more fatal cases of croup occurred in the same house, either upon the same day or within a few days of each other.

In twenty-eight instances, in each, both cases were reported as croup or membranous croup.

In thirteen instances, in each, both as diphtheritic croup.

In fifteen instances, in each, one case as diphtheritic, and the other as simply croup, or as membranous croup.

In two instances, in each, one as croup, the other as laryngitis or tracheitis.

In one instance, one as diphtheritic croup, the other as tracheitis.

In three instances, in each, both alike as laryngitis or tracheitis. The strong presumption, almost certainty, is that all of these cases were diphtheritic in their nature.

† Steiner, op. cit., p. 259.

‡ Diseases under 29 different designations are included in this number. The following is the list, arranged in the order of frequency with which each term is used:

Membranous Croup.	Œdema Glottidis.
Croup.	Angina Crouposa.
Diphtheritic Croup.	Cynanche Laryngealis.
Laryngitis Crouposa.	Malignant Croup.
Cynanche Trachealis.	Laryngitis Catarrhosa.
Laryngitis.	Cynanche Tracheo-laryngealis.
Tracheitis.	Tracheo-laryngitis.
Pseudo-membranous Croup.	Tracheitis Membranosa.
Pseudo-membranous Laryngitis.	Angina Membranacea.
Membranous Laryngitis.	Catarrhal Croup.
Exudative Laryngitis.	Acute Laryngitis et Tracheitis.
Inflammatory Croup.	Angina Laryngea.
Laryngo-tracheitis Crouposa.	Angina Membranacea Trachealis.
True Croup.	Angina Trachealis.
Laryngo-tracheitis.	

I. CROUP IN BROOKLYN.

Croup is one of the chief fatal diseases that prevail in Brooklyn. The number of deaths occasioned by it annually has more than doubled since 1870*. During the same time it has risen from the 11th place in the scale of causes of death, occupied by it in 1870, to the 5th, gained by it in 1876†. Young children have been the chief victims of this disease, 2,301 in 7 years, 83 per cent. of all the cases examined, were in children less than 5 years of age. But 30 out of the entire number were 10 years or more of age.‡

According to its population, Brooklyn at the present time has a death-rate from croup nearly one and a half times as great as that of New

* The figures for the seven years are as follows:

1870.....	230	1874.....	391
1871.....	277	1875.....	588
1872.....	367	1876.....	535
1873.....	381		

† Tables of chief causes of death in the order of their prevalence, arranged from the official records of the Board of Health.

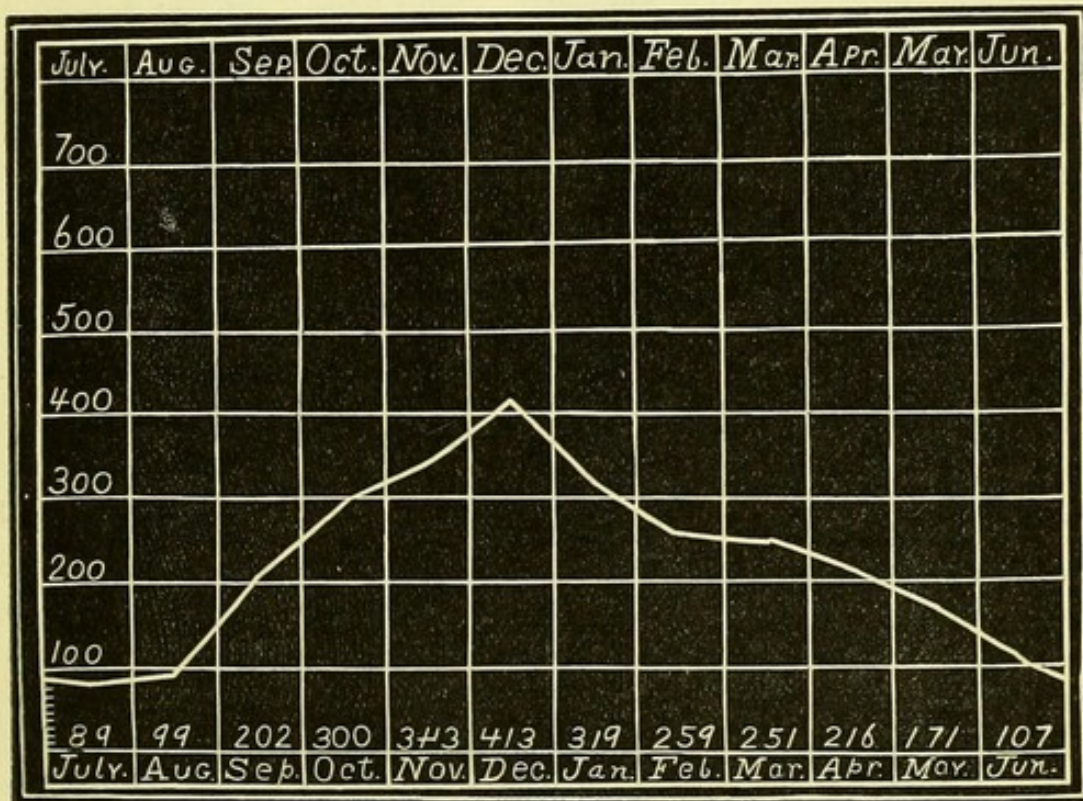
1870—(last 8 months only).	1876.
1. Diarrhoeal Diseases.....	1217
2. Consumption.....	835
3. Convulsions.....	455
4. Tabes Mesenterica.....	425
5. Pneumonia.....	285
6. Debility.....	283
7. Congestion of Brain.....	221
8. Hydrocephalus.....	191
9. Meningitis.....	183
10. Dysentery.....	180
11. Croup (including Laryngitis Ac.).	144
	1546
	1533
	881
	810
	412 (535)
	No record of the first 4 months of 1870 could be obtained.

‡ Table of Ages of Fatal Cases of Croup.

Age.	No.
Less than 6 months.....	57
Between 6 months and 1 year.....	175
1 to 2 years.....	661
2 to 3 ".....	590
3 to 4 ".....	497
4 to 5 ".....	321
5 to 10 ".....	438
10 and over.....	30
Total.....	2,769

York City, and more than twice as great as that of the State of Massachusetts.*

Croup varies as to its prevalence with the season of the year. In midsummer it counts its fewest victims. In September a decided increase in its prevalence takes place. In December the number of cases reaches the highest point, each of the intervening months having exhibited an increase above that of the month immediately preceding. With January an ebb begins which continues more and more apparent with each succeeding month until midsummer again is reached. This ebb and flow of the croup wave is illustrated in this diagram, which is constructed from the totals for each month during the period from 1870 to 1876 inclusive.



* According to the census of 1870, the population of Brooklyn was..... 396,099
 New York City..... 942,292
 Massachusetts..... 1,457,351

The deaths from croup, in the year 1875, as reported by the Health Boards of the City of New York and of the State of Massachusetts, were, for New York, 758; for Massachusetts, 680. The deaths from croup in Brooklyn for the same year, according to the record of its Health Board, were 451 (588 according to the definition of this report). Using the official figures for the purpose of comparing with official figures, the solving of a simple problem in proportion results as above stated.

Various sections of the city of Brooklyn differ greatly in the degree to which they are subject to the ravages of croup. The geographical lines marking out the croup districts can be quite distinctly traced. In the accompanying map* the location of each of the 2,769 fatal cases of croup, under examination, has been fixed, and is shown in each instance by a small black square. Black districts appear with startling distinctness by the side of districts almost entirely free from the tell-tale spots; at various points more isolated aggregations of spots mark out more limited croup centres; in a large part of the extensive area of the city, here and there spots tell of scattered cases of the disease. The darkest part of the map is seen to be within that quite regular parallelogram bounded by North Second Street on its northerly side, Bushwick Avenue on its easterly side, Flushing Avenue toward the south, Union Avenue and a line prolonged from it to the corner of Marcy and Flushing Avenues toward the west. Within this territory 418 fatal cases of croup are located, nearly one-sixth of the entire number. Within this territory live about one-eleventh of the entire population of the city (census of 1870). It includes portions of the fifteenth, sixteenth and nineteenth wards.

In that part of the city stretching from the district first referred to, in a south-westerly direction to the East River, lying between South Seventh and North Tenth Streets, many deaths are seen to have occurred. This includes portions of the thirteenth, fourteenth and sixteenth wards.

Passing over to the Western District of the city, two regions of special prevalence attract notice. One, extending upwards from the East River between the Navy Yard and Fulton Avenue as far as to Myrtle Avenue, continues eastward between Myrtle and Flushing Avenues as far as to Nostrand Avenue, sending out a spur along Raymond and Navy Streets and Hudson Avenue as far as to Lafayette Avenue. The second, beginning at Joralemon Street, lies between Henry Street and the river front, a large majority of the cases occurring below Hicks Street. It extends as far as Hamilton Avenue. From this point the black spots are seen to cluster around two diverging lines, the one following the line of Van Brunt Street, between Richards and Conover Streets on either side, to its termination at the water's edge; the other following the line of Hamilton Avenue to the Gowanus canal.

In addition to these dense croup districts, three others of lighter shade and less extensive are black enough to attract attention: the seventeenth ward, Greenpoint, at one extreme of the city; the vicinity of Greenwood Cemetery at the other, between Sixth and Second Avenues,

*See map prefixed to report.

and Sixth and Twenty-third Streets; and, lastly, the plot bounded by Atlantic Street, Fourth Avenue, Union and Court Streets.

The outlying, sparsely-settled portions of the city, including part of the seventeenth, all the eighteenth, twenty-fifth and twenty-fourth wards, much of the twenty-first, twenty-third, ninth, twenty-second and eighth wards, cannot fairly be made the subjects of comparison in such an examination as this. Here and there the small black squares appear throughout this territory.

Framed in by thickly clustering black squares, certain districts appear in which none, or but very few, are seen. The greater part of the nineteenth ward is wonderfully clean. Surrounded on three sides by the three black districts first described, the contrast presented is very striking.

The greater part of the first ward is equally in contrast with its surroundings. From Columbia Heights to Fulton and Court Streets, from Middagh to Atlantic Streets, save the corner bounded by Joralemon and Hicks, it presents a bill of health but slightly marred.

The triangle included between Fulton and Myrtle Avenues, extending from Cumberland Street to Tompkins Avenue, throughout most of its extent thickly built up, is comparatively free from the death spots, although scattered here and there they occur quite often enough.

The striking difference in loss of life experienced from croup in different portions of this city is not accidental. An examination into the conditions to which this difference may be referred brings out the following facts:

1st. Every district in which croup is seen to abound is a *tenement house* district. This means—*a.* Crowded, ill-ventilated, filthy habitations; dwellings in which every principle of hygiene is violated. *b.* Numerous children, the pabulum of the disease; the dwellers in tenement houses are of a class who are influenced little by the considerations which prompt the more intelligent and well-to-do to limit the number of their offspring. *c.* Large numbers of illy-nourished and weakly children, from improper diet, care and surroundings, the result of apathy, ignorance, prejudice and poverty in the parents.

2d. Every district presents *soil conditions of an unfavorable character*. This is a necessary corollary of the statement that they are occupied by the dwellings of the poor. Along the water front, occupying ground rescued from the river or bay; upon the site of marshes, now more or less obscured by the filling in process; in valleys that have been the site of water-courses, whose drainage is imperfect—these are the districts that appear so black in the map which has been presented.

Of some of these districts the Report of the Board of Health of Brook-

lyn for 1873-'75 contains graphic descriptions from its Sanitary Inspectors. With reference to the blackest of the croup districts, Inspector T. P. Corbally reports:

"It is estimated that at least one-third the area of the sixteenth ward and one-third of the fifteenth ward has been marsh ground, or ground covered with tide water." . . . "Much of this marsh has already been filled." . . . "The substance deposited is mostly organic matter, and is fermentable and putrescible in the highest degree."

"In most places the water rises to the level of the tide, within two or three feet of the surface, penetrates the rough walls and fills cellars, making the houses damp and unhealthy. There is absolutely no drainage, and, in many cases, the sewers are a positive nuisance, for the tide drives their contents into the cellars. Very often the storm-water forces the covers off the man-holes of sewers, and floods the street as well as the cellars. This happens frequently on Broadway near McKibbin Street. I have been informed by the Alderman of the sixteenth ward that the same thing has occurred in Graham Avenue near Scholes Street. Thus surface water and tide water contribute to increase the moisture of the porous soil in this district."

With reference to the district seen lying below Henry Street, Inspector F. H. Colton reports:

"A glance at the map on which are outlined the original water front, the old water-courses, the location of ponds and marshes, in the first, sixth and twelfth wards, will show how large sections of these were formerly *wholly uninhabitable*, where now dense populations cover them all. In the south-west corner of the first, beginning a little below Joralemon Street, the water line penetrated nearly to Willow Place.

"In the sixth ward, all west of Columbia Street was either water or a marsh, with here and there a little spot, designated on the map as an island. At one point, between Harrison and Degraw Streets, what was known as Cornell's Pond, though really an outlet to the sea, penetrated almost to Hicks Street. Much of Hicks Street itself required to be 'built' in order to meet an established grade.

"The section comprising the twelfth ward was virtually a single marsh, or a part of the bay, and much of it is an unredeemed marsh still. Low and flat, with no natural drainage, and, until lately, scarcely an attempt at artificial drainage, it holds on its shallow, soggy soil twenty thousand inhabitants. So-called improvements were a travesty on the word. Highways were constructed of the vilest material, and no provision was made for draining the intervening basins. Water fell into and was held by them; polluted by stagnation, it polluted the air by evaporation, carrying with it the products of vegetable and animal decomposition. Gradually, as it became desirable to prepare these lands to be built upon, the ponds were filled in and the water was put out of sight, simply, with deposits similar to those which had formed the streets. It was a system of *soakage* not *drainage*, by which a foundation was made for the homes of thousands."

With reference to the district lying north of Atlantic Avenue, between Court Street and Fourth Avenue, Inspector J. H. Raymond reports:

"A glance at a map of Brooklyn, showing the old water-courses, will demonstrate that the unhealthy part of the tenth ward, in the neighborhood of the canal, was once a marsh, the creek running far into what is now a densely-populated district. To render this sufficiently solid to build upon, it was filled in, and in this process, then, as

now, no regard was paid to the natural course of the water, nor to the kind of material used in filling. Obstructed water-courses and made land—that is, land made of mixed ashes and garbage—account for the high mortality of this and other similar regions.”

Similar conditions, in varying degree, exist in each of the other croup districts. Details of the condition of each would not add anything to the proof of the influence which bad soil conditions have in the development of croup.

A different witness, remarkably confirmatory of the power of local conditions in the production of croup, is found in the comparison of the experience of New York City and Brooklyn.

According to the report of the Metropolitan Board of Health, 1869, 468,492 people lived in the tenement houses of New York City at that time.

During the time which has elapsed since then, the increase in the number of the tenement house population has been greater in proportion than in that of the better classes. In 1875 the number must have approached 600,000—a moderate estimate. It certainly exceeded 500,000, a number greater than that of the entire population of Brooklyn at that time (484,676). In the matter of herding people into these tenement houses, Brooklyn has nothing to compare with that which is seen in New York; nevertheless, the comparative death-rate from croup in Brooklyn has been seen to be nearly one and a half times as great as that in New York (see page 7). To the differing local soil conditions must this difference in great degree be attributed.

In point of squalor and overcrowding the tenement house districts of Brooklyn are equaled and even surpassed by those of other cities; but no other city can present such extensive districts, teeming with population, beneath whose feet is a soil so reeking with moisture, and so productive of dangerous miasms.

It is pleasant to turn from these dark places to those that are light.

The triangle in the Eastern District, included within Broadway, Penn Street and Wythe Avenue, is a beautiful knoll, gently sloping in every direction, with a dry sandy soil, well sewered and drained. Intersected by Lee and Bedford Avenues, it is well built up with handsome dwellings, and its inhabitants are refined, intelligent and well-to-do. It is the choice spot of Williamsburgh. In this region but twelve spots can be counted, and these are upon its outskirts.

The description of Brooklyn Heights, comprising the second of the bright districts noted, is similar. In the words of Dr. Colton:

“No section of the city, probably, has had its original contour less modified, in the construction of streets and preparing it for habitations, than that comprising the old third ward. There were no hills to be removed; no low places to be filled with

street and house refuse; no ponds to be soaked up; no water-courses to be interrupted; and its area was not enlarged by encroaching upon the waters of New York Bay. It held an elevated site, with a deep, dry soil; at the same time sloping sharply in two directions and slightly in a third, surface water could not become ponded, but was conveyed promptly outside its borders. Its streets were early sewered after the introduction of the system of sewers into the city, which more completely provided for surface drainage."

Though compactly built up, the black spots within its borders can be counted upon one's fingers.

A description of the third district, that known in the common parlance of the city as the "Hill," would be a repetition of the same things.

The consideration of the elements of living presented in the description of these districts would constitute a treatise upon the prophylaxis of croup.

Isolated cases which occur in regions free from those conditions which this examination has shown to be fruitful in croup, are the result of special combinations of influences peculiar to the house or immediate neighborhood in which they occur. Some very instructive examples of this have come under the observation of the committee. Details of these cases must be omitted here. Soil moisture and noxious miasms always appear in varying degree as factors in the development of croup.

The influence of the season of the year in increasing the mortality from croup, to which attention has previously been called, is the more fully appreciated when considered in connection with these local conditions.

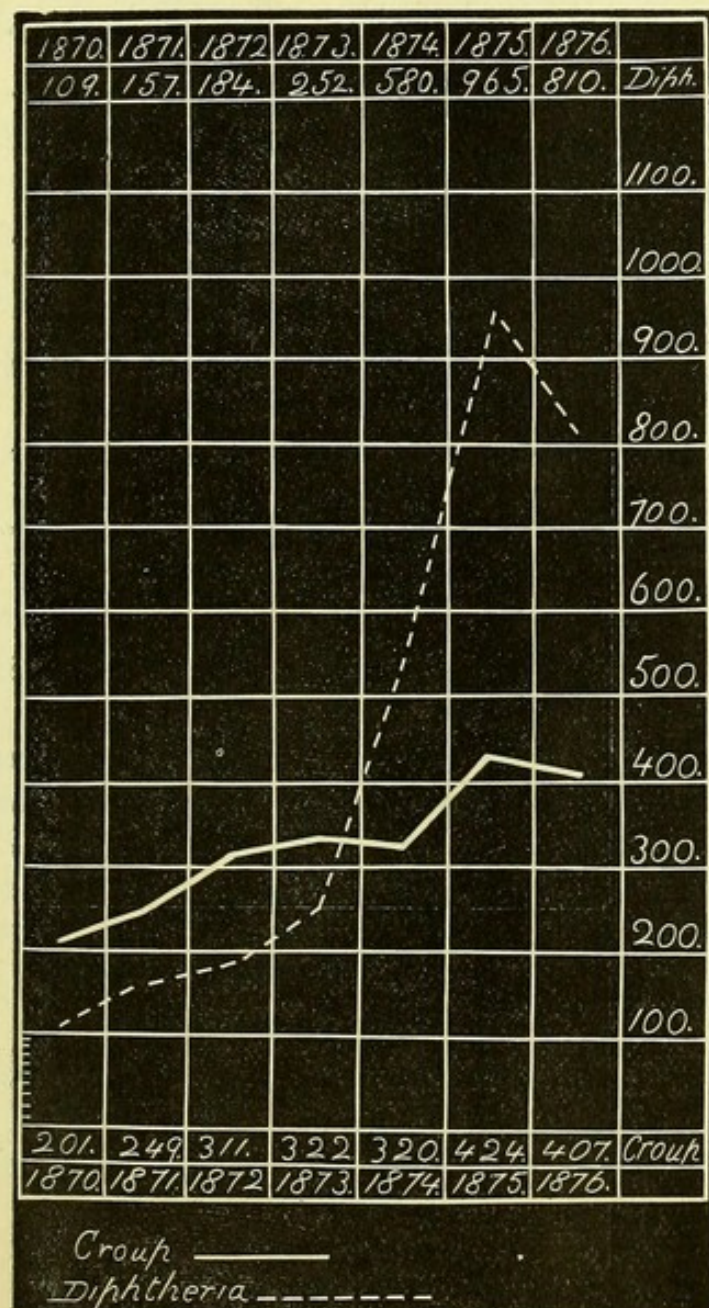
Low temperature alone is innocent of blame in the genesis of true croup. Low temperature, combined with the influences arising from residence on ground saturated with moisture and reeking with miasm, affords a combination in the highest degree favorable for its development. With the coming on of cool weather there results condensation of moisture, producing increased dampness of dwellings; into such dwellings their occupants crowd; for the purposes of warmth, every aperture which might let in fresh air is closed; of ventilation there is none; of sunlight but little; the miasms that are ever present in the atmosphere are intensified and energized; vital force is sapped; croup and diphtheria and kindred diseases increase and abound, decimating the young children that yet remain from the peculiar diseases which the same local conditions, combined with the heat of summer, have made the terror of the warm season.

Why croup should prevail in one locality and not in another—why it should prevail in cold weather and not in warm weather—the local experience, of which an analysis has been attempted, gives sufficient reasons in explanation. Why, in 1870, the fatal cases should have numbered 230, and in 1875 588, more than twice as many, receives no ex-

planation from any consideration as yet presented. The difference in population is not sufficient to begin to account for it. Slight variations from year to year might be referred to varying atmospheric conditions—temperature, moisture or prevailing winds; but even these, if proved to have been present, could not explain the enormous increase stated. It is easy enough to say that an epidemic constitution has been engrafted upon the disease. This explains nothing, is simply another way of stating the same fact. Upon what peculiar atmospheric conditions this influence depends for its existence or its power, this examination throws no light. That it exists is beyond dispute.

From this region of inquiry, that of the sanitarian, the close kinship of croup and diphtheria is again demonstrated, for simultaneously with this increase of croup to a condition of epidemic intensity, diphtheria has also manifested similar activity.

The number of deaths reported from diphtheria in 1870 was 109; in



1875 was 965; in 1876 decreasing to 810. The deaths from croup, as compiled by the committee, excluding those reported as diphtheritic croup,* in 1870 was 201; in 1875, 424; in 1876, 407. The preceding diagram shows the relative course of the diphtheritic and croup mortality waves during the years under examination—1870 to 1876.

One point only remains for examination, viz.: the proportion which these fatal cases of croup bear to the entire number of cases of the disease which have occurred. The most remarkable diversity of experience among us, in this respect, seems to have existed. The epitomized experience of thirteen physicians, in full practice in various parts of the city, is subjoined.

“Over one hundred cases conducted to a favorable issue.”

“Has never seen a fatal case of croup in his own practice since employing crude kerosene by inhalation and as a counter-irritant.”

“In twenty-six years’ practice but five fatal cases of croup.”

“A favorable change often occurs in the most desperate and unpromising cases.”

“In cases properly cared for a large proportion recover.”

This is one aspect of the picture; quite another is testified to by the remaining witnesses:

“In membranous croup, in children under five years of age, about eight per cent. only recover.”

“Generally fatal.”

“Nearly all his cases recorded in the Archives of the Board of Health.”

“Never knew a child under five years of age to recover from membranous croup.”

“Almost never recover; perhaps one case in a hundred.”

“Among twenty-five cases but one has recovered.”

“Invariably fatal.”

“All cases except those seen in the beginning of the attack have ended in death.”

This is an epitome of the statements received. The difference between the extremes is beyond exaggeration. It is evident that the conditions upon which the statements at either extreme are based are entirely different. Slight catarrhal laryngitis with spasm of the laryngeal muscles,

* The number of deaths reported as from diphtheritic croup, in each year, was:

1870.....	29	1874.....	71
1871.....	28	1875.....	164
1872.....	56	1876.....	128
1873.....	59		

or catarrhal laryngitis simply, more or less severe, evidently form the croup of one class, while the others speak only of laryngitis accompanied with membranous exudation. Catarrhal laryngitis, the result of exposure to cold, or to cold and moisture, is of comparatively frequent occurrence, even in localities the most favored; is amenable to treatment, especially when prompt; but sometimes of uncontrollable severity and with fatal termination. In all statements as to treatment and prognosis, this kind of croup is to be kept distinctly separated from that other croup, in the production of which not only cold and moisture have entered, but also, and of prime importance, a miasmatic poison, as the result of which membranous deposits gather upon the inflamed surfaces; not responding to treatment quickly; generally fatal; sometimes within a few hours of the first onset of the disease.* This is the croup which we have seen the conditions of certain portions of our city cause to be endemic therein; this it is which, occurring in young children, some of our wisest and most experienced physicians declare to be almost invariably fatal. This disease, before which the physician stands confessedly powerless—can it be met with any greater degree of success by the surgeon? In this inquiry this city of Brooklyn is more deeply interested than any other in this country.

II. TRACHEOTOMY IN BROOKLYN.

More or less complete details of 121 operations of tracheotomy, done in this city for the relief of croup, have been gathered. Very few of these have hitherto been published. They constitute a fresh contribution to the literature of the subject. The names of the operators, and the results obtained in these cases, are as follows:

	Total No. cas's	Results.			Total No. cas's	Results.	
		Recov'd	Died.			Recov'd	Died.
G. H. Atkinson...	1		1	W. C. Otterson...	1		1
J. Ball.....	2	1	1	L. S. Pilcher.....	5	3	2
I. H. Barber.....	1		1	O. S. Pine.....	4	1	3
D. Bloodgood....	1		1	J. C. Rappold....	12	2	10
G. Buck (for Dr. C. L. Mitchell).	1		1	J. H. Raymond...	1		1
E. S. Bunker.....	2		2	H. N. Read.....	4	1	3
A. B. Crosby.....	1		1	H. Riedel.....	1		1
G. A. Evans.....	2		2	F. W. Rockwell..	8	2	6
G. R. Fowler....	12	3	9	W. F. Sanford....	1		1
M. Figueira.....	2		2	S. Sherwell.....	2	1	1
H. J. Garrigues...	1		1	F. H. Stuart.....	1		1
A. G. Gerster.....	1		1	G. Wackerhagen .	1		1
C. H. Giberson...	1		1	W. Wallace.....	1	1	
W. Gilfillan.....	4	1	3	J. Watt.....	1		1
R. Hesse.....	3		3	W. T. White.....	1	1	
J. C. Hutchison...	25	2	23	J. S. Wight.....	1		1
C. Jewett.....	2		2	R. M. Wyckoff...	1		1
J. Krauter.....	12	4	8	Total.....	121	24	97
H. Loewenstein...	1	1					

* See Note, next page.

ANALYSIS OF CASES.

The SEX was stated in 91 instances. These were—males, 52: of whom 13 recovered; 39 died. Females, 39: of whom 10 recovered; 29 died.

AGE.—In recoveries, stated in 23 instances: One case occurred at the age of 52. Of the remaining 22, the youngest was $2\frac{1}{2}$ years; the oldest, 11 years; the average being 5.3 years.

In fatal cases, stated in 67 instances: The youngest, 11 months; between 1 and 2 years in 12 instances; the oldest, 12 years. Average, 4.3.

CHARACTER OF ATTACK.—This is stated to have been catarrhal in 6 instances, of whom 3 recovered, 3 died; membranous in 31 instances, of whom 12 recovered, 19 died; diphtheritic in 58 instances, of whom 8 recovered, 50 died.

DURATION OF ATTACK PRIOR TO OPERATION.—Stated in 19 instances of the cases which recovered. The shortest time was 4 hours; the longest, 6 days; the average, 3 days.

Stated in 45 instances of the cases which proved fatal. The shortest time was $4\frac{1}{2}$ hours; the longest, 8 days; the average, 3.5 days.

CONDITION OF PATIENT AT TIME OF OPERATION.—Stated in 20 instances of the cases which recovered. Apparently dead, 1; moribund, 6; nearly asphyxiated, 2; cyanotic, 3; dyspnœa intense, 3; dyspnœa increasing, prostrated, 3; dyspnœa increasing, strength still good, 2.

Stated in 78 instances of the cases which proved fatal. Comatose, 1; moribund, 18; nearly "in articulo mortis," 24; almost asphyxiated, 8; cyanotic, 7; cyanotic, with great dyspnœa, 9; feeble, intense blood poisoning, 7; strength good, dyspnœa great, 4.

DURATION OF LIFE AFTER THE OPERATION IN FATAL CASES.—Stated in 66 instances. But a few minutes, 3; less than 24 hours, 19; died on 2d day, 13; died on 3d day, 19; died on 4th day, 1; died on 5th day, 3; died on 6th day, 4; died on 8th day, 2; died on 14th day, 1; died on 18th day, 1.

IMMEDIATE CAUSE OF DEATH AFTER OPERATION.—Stated in 62 instances.

1. Asthenia in 24 cases: catarrhal, 2; membranous, 6; diphtheritic, 16. One case lived 8 days; one case lived 18 days. The average of the remaining 19 was 32 hours.

2. Asphyxia, from accumulation of exudation below canula, in 16 cases: membranous, 4; diphtheritic, 12. Average duration, $2\frac{3}{4}$ days.

*The duration of the disease, from its inception till death, was given in 1,760 cases of children less than five years of age. Of these 22 died within 12 hours; 159 within 24 hours, and 57 per cent. of the whole number within three days. Of those between five and ten years of age, 43 per cent. died within three days.

3. Bronchitis and pneumonia in 13 cases: membranous, 3; diphtheritic, 10. Average duration, $4\frac{1}{2}$ days.

4. Death immediately after the completion of the operation—no benefit experienced, in three cases: membranous, 2; diphtheritic, 1.

5. Epileptiform convulsions, 10 hours after operation, in one instance, a child 18 months of age. Case one of membranous croup.

6. Accidental death, from carelessness or ignorance of attendants, in 5 instances. Tube displaced in 2 cases; tube obstructed in 3 cases.

ANÆSTHETICS.—In the performance of the operation, where an anæsthetic was used, the kind was stated in 67 instances as follows:

Chloroform, 36: recovered, 9; died, 27. Ether, 27: recovered, 7; died, 20. Chloroform and ether, 4: recovered, 1; died, 3.

Two instances are recorded in which dangerous chloroform narcosis complicated the operation. Nitrite of amyl was used with apparent benefit in both instances.

THE POINT OF INCISION into the trachea was stated in 77 instances, having been above the isthmus of the thyroid gland in 30 cases: of whom 10 recovered, 20 died; below the isthmus of the thyroid gland in 44 cases, of whom 12 recovered, 32 died; behind the isthmus of the thyroid gland, which was severed, in 3 cases, of whom all died.

COMPLICATIONS OF THE OPERATION.—Troublesome hemorrhage is the chief complication noted as having been experienced, 19 instances being reported in which this occurred. In one of these, an artery of some size was wounded, presumed to have been an instance of the presence of the thyroidea ima artery.

Asphyxia and syncope to such an extent as to demand artificial respiration and the injection of stimulants for the purpose of resuscitation, is reported as having taken place in 10 instances, of whom 3 ultimately recovered.

COMPLICATIONS AFTER THE OPERATION.—Emphysema, superficial abscess of the neck, sloughing of the edges of the wound, and prolonged laryngeal stenosis are reported as having occurred, each in one instance; final recovery resulted in all these cases.

Erysipelas of the wound developed in one case, with a fatal termination.

Of the cases that recovered, in one the canula was retained more than 12 months; in 1 instance 4 weeks; in 14 instances between 1 and 2 weeks; in 7 instances less than 1 week, the shortest time having been 3 days.

REMARKS.—It will be seen that in nearly every instance tracheotomy was not resorted to until the patient's condition had become desperate; nevertheless, 20 per cent. of those operated upon were rescued from the

death impending and restored to health. It has been thought that the proportion of recoveries in cases occurring in private practice would be greater than that which had resulted in hospital practice. A recurrence to the statements which have been made as to the conditions in which membranous croup is developed, will show the error of such an expectation. Occurring among the class of our population described, the treatment pursued in localities so unfavorable, with attendants unskilled and ignorant, the chances for recovery must be less than that which a well-ordered hospital would afford. These statistics from private practice, therefore, represent the results which may be expected in the most unfavorable circumstances. They are especially trustworthy for the reason that equal care has been taken in their compilation to obtain records of unsuccessful as of successful cases.

A classification of the cases operated upon according to the character of the attack, whether catarrhal, membranous or diphtheritic, has been given; but the uncertainty as to the accuracy of the diagnoses given, which was stated as existing in connection with the records of the Board of Health examined, is likewise found here, so that no deductions of value can be drawn from the figures as given.

An examination of the causes of death after operation is fertile in subjects for reflection and discussion.

The three chief causes of death, subsequent to the operation, were asthenia, asphyxia, from accumulation of exudation below the canula, and bronchitis and pneumonia. Of the 62 cases in which the cause of death was recorded, 20 died by asthenia, living, upon the average, 32 hours; 16 died asphyxiated, living, upon the average, two and a half days; and 13 succumbed to bronchitis and pneumonia—simply or combined—after a struggle of four and a half days.

This teaches that the first and most quickly operating danger met by a tracheotomized patient is *exhaustion*. In the production of this exhaustion there are two chief factors—viz.: *a*. The unintermitting violent muscular efforts put forth by the patient in the respiratory act, an element of danger in prolonged dyspnoea not sufficiently realized in general; *b*. Blood poisoning. To the depressing effect of the primary miasmatic poison (whether diphtheritic or otherwise), which has depraved the blood, as an essential prerequisite to the development of the disease, is added the toxic effect of deficient oxidation. These conditions have exerted their full and combined power previous to the operation; the more prolonged the period of dyspnoea previous to operation, the more intense their effect.

By the operation, undue muscular effort and imperfect oxidation of the

blood are eliminated from the case; but the results of their former presence remain in a condition of continued exhaustion, from which the vital powers of the patient, even in his changed circumstances, are not sufficient to rally him, and speedy death ensues. In cases of recognized diphtheria, the continued depressing effect of its blood poison is felt by all as a powerful agent in the production of death by asthenia after operation. In like manner, though to a less degree, are the vital forces called upon to struggle against a peculiar blood poison in those cases classed as membranous simply.

The ability of the patient to rally from this exhaustion is diminished by the damage which has been inflicted upon the lungs by the very efforts which have been made to inflate them. As the result of the prolonged stenosis of the larynx or trachea, the rarefaction of the air within the alveoli, and the extraordinary exertions of the respiratory muscles in accomplishing the expansion of the thoracic cavity, emphysematous dilatation and œdematous infiltration have so damaged the lungs, that when air is again fully introduced it cannot be utilized—it is too late!

If the vitality of the patient shall not have been exhausted so far but that he has been able to rally from this state of exhaustion, and has escaped this immediate danger, the second element of danger which these cases teach to be met is that of the extension of the membranous deposit to the portions of the trachea and of the bronchi below the opening of the canula, and its accumulation to such extent as to cause death by asphyxia at last. This danger having been escaped, with the prolongation of life bronchitis and pneumonia present themselves as a frequent cause of death.

Niemeyer says* that "the comparatively insignificant results of tracheotomy in protracted croup are due solely to this complication, whose frequency can usually be shown to be a necessary result. When the thorax expands and the alveoli enlarge without admitting a proportionate quantity of air, the air in the bronchi and alveoli must become rarefied, and must act upon the bronchial mucous membrane and inner wall of the alveoli in the same way as a cupping-glass does upon the skin, producing hyperæmia and increased transudation from the vessels, in consequence of the diminished pressure upon the walls of the vessels."

Bronchial catarrh results from the mechanical conditions thus described not only, but also in the usual manner by extension from the mucous membrane of the larger air tubes, or is excited by the continued action of the conditions which determined the primary laryngitis. The inspiration of cold air, unwarmed by passing through the upper air pas-

* Niemeyer, Pract. Med., Vol. i, p. 24.

sages, or the inhalation of irritant substances through the canula, may be sufficient to excite fatal bronchitis in cases that had previously been promising.

In several cases under examination a temporary fall in the temperature of the air being respired by the patient was followed immediately by the development of fatal bronchial inflammation.

The five deaths from the carelessness or ignorance of attendants, gives force to the frequent statement that constant watchfulness and presence of mind are demanded upon the part of those to whom the care of patients is to be confided after tracheotomy.

The propriety and safety of the use of anæsthetics in many cases is confirmed by the experience recorded. A very little of any anæsthetic usually suffices. Common prudence would dictate its sparing use. Generally it may be dispensed with after the first incision is completed. The special danger inherent in the use of chloroform, happily counteracted in the two instances noted in the analysis of cases by the use of nitrite of amyl, points to the adoption of ether as the anæsthetic most proper for use in tracheotomy.

Although in the greater number of instances the trachea was incised below the isthmus of the thyroid gland, in a large number the high incision was adopted, the cricoid cartilage being also divided in many. These latter appear to have resulted quite as favorably as the former. No special evil result is reported as having followed the division of the cricoid cartilage. As being more simple, and executed with more facility than the low operation, it recommends itself in many cases.

The extreme condition in which many cases are before being subjected to operation, is shown by the ten instances recorded in which, at the completion of the operation, apparent death had taken place, demanding the utmost promptness and skill upon the part of the operators for their resuscitation. The three complete recoveries noted are three lives snatched from death!

RÉSUMÉ.

In the first part of this report, croup was examined by the light of the special conditions by which it was demonstrated to be surrounded in this city of Brooklyn. The results condensed are presented in the following *résumé*.

The term croup, comprehending *all forms of acute inflammatory affections of the larynx or trachea which may produce narrowing of their calibre to such an extent as to occasion serious prolonged dyspnœa*, was found practically to embrace three conditions, designated respectively

as *catarrhal croup*, an inflammation of the mucous lining of the larynx and trachea, in which the secretion present, whether scanty or abundant, is always liquid.

Membranous Croup, an inflammation of the same mucous surfaces, in which the secretion present is formed into a false membrane of varying thickness, and more or less intimately adherent to the mucous membrane, which it covers.

Diphtheritic Croup, in which the local condition is identical with that known as membranous croup, but which is recognized as a part of a general diphtheritic infection.

These three conditions are so frequently confused, the first with the second especially, and the two last with each other, that great uncertainty with regard to the meaning of terms, and confusion as to modes of treatment and results to be expected therefrom, has arisen.

Catarrhal croup results from exposure to cold, or to cold and moisture.

Membranous croup demands for its production not only cold and moisture, but also a miasmatic poison. The character of this poison is allied to that which is active in diphtheria.

The climatic and telluric conditions of large portions of the city of Brooklyn are favorable to the development of the worst forms of croup.

The effect of these conditions is intensified by the social condition of the inhabitants of these localities.

Croup is one of the chief fatal diseases of Brooklyn.

An epidemic influence has impressed upon it an activity at the present time double that of five years ago.

In the second part of this report the results of 121 tracheotomies for the relief of croup have been examined. With very few exceptions, in these cases the operation was not resorted to until death was imminent, every other resource having been exhausted; 24 recoveries resulted, 20 per cent. of the whole number of operations, a demonstration that *even in the last extremity the operation of tracheotomy holds out material hope of recovery*. In the cases which terminated fatally, in a large majority, death was found to have resulted from causes directly dependent upon *the prolonged dyspnoea to which the patient had been subjected previous to operation*.

III. FACTS DISCUSSED—CONCLUSIONS STATED.

In attempting to form a just estimate of the proper place in the treatment of croup to be assigned to tracheotomy, the following questions require an answer:

1st. What occasions death in croup?

- 2d. What is the expectation of life in croup?
- 3d. How will tracheotomy prevent death in croup?
- 4th. Will tracheotomy in any case increase the danger of death in croup?
- 5th. What are the objections to tracheotomy?
- 6th. In what cases is tracheotomy indicated?
- 7th. In what cases is tracheotomy contra-indicated?
- 8th. At what time should tracheotomy be resorted to?

1st. *Death in croup* may result from carbonic acid poisoning, inducing general paralysis; from croupous bronchitis; from diffuse catarrh of the air passages; from pneumonia; from œdema glottidis; from acute œdema of the lungs, and from suffocation from complete occlusion of the glottis by a piece of loosened membrane.* These different conditions may be present in varying number and degree in different cases. Exhaustion from prolonged excessive muscular efforts in respiration is an added element of danger in all cases except those in which death occurs within a few hours of the inception of dyspnœa. Diphtheritic septicæmia, when present, intensifies the action of the other causes, and may itself alone determine the fatal termination.

2d. *The expectation of life in croup* has been discussed already in this report in another connection. From the considerations stated, we conclude that the expectation of life is less in cases occurring in children under five years of age, than when children above that age are affected. Unfortunately, the vast majority of cases occur in children less than five years of age. That in *catarrhal* croup a large majority of the cases will recover, with proper treatment; in *membranous* croup recovery rarely takes place—the proportion of recoveries is merely large enough to show that a case may not necessarily be utterly hopeless. In *diphtheritic* croup recovery takes place yet more rarely. The instances in which it has occurred are so exceptional, that they afford no ground for hope in any given case.

3d. *Tracheotomy will tend to prevent death in croup* by making possible free access of air to the lungs, and thus: 1st. Relieving or preventing carbonic acid poisoning, and its sequel, general paralysis; 2d. Supplying the blood freely with the best of tonics or stimulants, oxygen, it assists in the struggle to eliminate the special blood poison present, favors the limitation of the disease and lessens the danger of croupous bronchitis; 3d. At once ending the cupping-glass action, exerted upon the whole surface of the respiratory tract below the larynx—heretofore described—it lessens the danger of the occurrence of diffuse catarrh of the

* Steiner, op. cit., p. 255.

air passages, of pneumonia, and of œdema of the lungs, and promotes recovery from these conditions when not already too extensively developed; 4th. Rendering respiration free and easy, it prevents exhaustion from excessive muscular exertion, and tends to relieve it, if already present. It tends to prevent death by eliminating from the possible causes of death œdema glottidis, and occlusion of the glottis by a piece of loosened membrane, through the establishment of a temporary opening for the entrance of air at a point between the glottis and the lungs.

It prolongs life, and thus gives increased opportunity for the action of remedies, and for a rallying of the powers of nature sufficient to throw off the disease.

4th. The causes of death incident to croup itself being to so large a degree antagonized by tracheotomy, upon the question whether the new dangers introduced by the operation are greater in degree than those previously present, depends the answer to the question, *Will tracheotomy in any case increase the danger of death in croup?*

Upon this point each case must constitute an individual study; the question must be raised and settled anew for that particular case.

Upon the condition of the patient at the time of the operation and upon the skill of the operator, depend largely the magnitude of the new dangers incurred. Of these the first, in time and in importance, is hemorrhage, both during and after the operation. 2d. Traumatic fever, especially severe in children less than two and a half years of age. These are the two most important dangers. In addition, phlegmonous inflammation, erysipelas, gangrene and diphtheria of the wound may occur. Emphysema, mediastinal abscess and ulceration of the trachea also may complicate the case.

The inhalation of cold air or of irritating substances through the tube are additional sources of danger.

The obstruction of the tube by pieces of membrane, or by the gradual accumulation within it of dried mucus, and the accidental displacement of the tube, may cause death.

Nearly every one of the conditions enumerated may be avoided by skill and carefulness in the management of the patient. Those which cannot be avoided may be greatly mitigated by treatment. Some can only happen as the result of gross carelessness or ignorance. They thus become, in general, insignificant, when contrasted with the imminent dangers present in the disease for the relief of which the operation is to be instituted. The circumstances surrounding each case, however, to repeat, must determine the conclusion in that particular instance.

5th. *Objections to Tracheotomy.*—A most important class of objections is

purely sentimental in character. The extreme reluctance on the part of friends, already overwhelmed with grief at the sufferings of a beloved child, to subjecting it to any new suffering is often insuperable.

The terrors surrounding the operation and the amount of pain resulting to the patient are greatly exaggerated in their minds. The possibility that, after all, recovery may not take place, and by the operation the sufferings of the patient will only have been prolonged, adds force to the previous considerations. These objections are the first to be considered at the bedside. By the earnest and enthusiastic surgeon, thoroughly imbued with a belief in the value of the operation, they can in most cases be overcome. By the surgeon or physician, who is himself greatly influenced by the same sentimental considerations, and who is uncertain in his convictions, after all, as to the value of the operation, they will be strengthened, rather than overcome. As objections to be weighed in determining the real value of a proceeding they can have no place. Three objections of a different character are frequently urged. 1st. If performed before the patient is *in articulo mortis*, it may have been unnecessary, for a possibility exists that the patient might have recovered without it; if delayed till that time, the hope of benefit to accrue is very small, therefore it is to be rejected. The conditions upon which the soundness or fallacy of this reasoning is based have previously been fully considered. Though some cases are on record in which after the condition of the patient had become most desperate—after, indeed, tracheotomy had been urged as the only resource left, but had been refused—a favorable change had occurred, and recovery had taken place; yet the considerations already fully set forth in this report, demonstrate that in any given case such an event is to be regarded only as a bare possibility; the probabilities are all that it will terminate fatally. Even should it recover from the immediate attack of croup, it cannot be otherwise, in the great majority of cases, than with permanently damaged lungs, the result of the prolonged laryngeal stenosis which has been present. It must not be overlooked that these cases of unexpected recovery are almost uniformly in children above five years of age. During the past winter eight cases of severe croup have come under my observation; in all tracheotomy was advised; in six it was refused or procrastinated until too late to be of service; with one exception these were all in homes of comfort, some even of wealth, and all received every attention which money could command, or love and medical skill could suggest. They all died. In the remaining two instances, tracheotomy was done at once upon the supervention of threatening symptoms; one was in the case of an anæmic child, living in a cellar in the most abject poverty, debilitated by want

of proper food and of sunlight, the croup a complication of general diphtheria. This child died. The second case, diphtheritic likewise, but in a home of intelligence and comfort, recovered. In view, therefore, of the very small probability, in any one case, of the condition taking place upon which this objection is based, the conclusion is unavoidable that it is of no weight as contrasted with the great benefits demonstrated to result from the timely performance of tracheotomy. That part of this objection depending upon the slight prospects of good resulting from the performance of the operation at a certain time is an objection not against the operation, but against its delay till that time, and will come up for consideration in the answer to the eighth question. The second of these objections is like unto the first, and grows out of it. In the words of an eminent practitioner to the writer, tracheotomy "robs the sufferer of the slight chance remaining for a possible favorable change." Does it? If so, then all that has been said in answer to the first and third questions of this series is wrong. If what has been stated there is correct, then in the most unfavorable circumstances it increases the chances for recovery vastly. Only in one possible event can any chance for recovery be taken from the patient by the operation—that is, when performed in so bungling a manner that it is a butchery rather than an operation; and then it is not the operation of tracheotomy that does the injury, but the wretched operator!

Thirdly, new foci of irritation, infection and gangrene may be established as the result of the operation. This is true more especially of the operation in cases of diphtheritic croup. The more intense the blood poisoning, the greater the danger from the complications in question. But the very severity of the symptoms constitute the loudest call for the operation, that imperfect aëration of the blood shall not intensify yet more the blood poison; that a second blood poison shall not complicate the case; and that the tonic and stimulant effect of the oxygen of the air may not be denied as a remedy to the failing vital forces. Shall a possible minor danger prevent the adoption of the means demanded for the relief of the immediate great danger? Such considerations are not permitted to influence the physician in other conditions.

6th. Tracheotomy is indicated in all cases of croup in which laryngeal stenosis becomes so great as to become an element of danger, either immediately, by rapid suffocation, or by a more gradual asphyxia, resulting from a slow accumulation of carbonic acid in the blood; or when, by its long continuance in a less severe form, danger is imminent of the production of diffuse bronchial catarrh or acute œdema of the lungs, or from the exhaustion occasioned by prolonged excessive muscular exertion in sustaining respiration.

It is unnecessary to defend these indications in detail. They are the logical and unavoidable conclusions of the facts which have been already stated. Accept the premises as true, and the conclusion cannot be rejected.

7th. When is tracheotomy contra-indicated? The one indication for tracheotomy being present, laryngeal stenosis to such a degree as to be a source of danger either directly or indirectly, there can be no contra-indication to the operation. If the danger is not from the stenosis, but from septicæmia dependent upon other conditions, as in many cases of diphtheria, the indication for the operation does not exist. But whatever the degree of septicæmia, if the stenosis is great enough to materially intensify it, it does not constitute a contra-indication to the operation. Existing pneumonia, bronchitis, exhaustion, even apparent death, instead of contra-indicating, do the more distinctly indicate it.

These and other complications impair the prognosis, but do not justify the surgeon in abandoning to his fate a suffocating child. The literature of the subject abounds in instances in which, despite the gravest complications, recovery has been secured.

8th. At what time should tracheotomy be resorted to?

This is a question of the utmost importance to the patient, upon which widely differing opinions have been entertained by surgeons. In nearly all the cases reported in this paper it was resorted to only as a last resource, when death was imminent. By large numbers of the profession it has been regarded as hardly justifiable under any circumstances. On the other hand, Trousseau's latest utterance on this subject was in these words: "I still maintain that the earlier the operation is performed, the greater are the chances of success."*

The latest systematic writer on croup, Steiner,† says: "I agree with those writers who urge an early operation, and do not defer it until urgent symptoms of carbonic acid poisoning have manifested themselves."

This, after all, is the focal point of all discussions upon the subject of tracheotomy in croup. Upon the determination of this bears all the discussion which has now preceded. It is a point to be determined by the cool judgment of the physician in each individual case, in the plane of reason and common sense, his decision founded upon a complete weighing of all the elements present in the case. Whether any or all of the conditions are present which have now been discussed as a part of croup, he is to decide. If in his opinion they are, then the following question is for him to answer:

* Trousseau, Clin. Med., Philad. Ed., vol. i, p. 431.

† Steiner, op. cit., p. 269.

How long am I justified in deferring the application of a remedy which at once puts an end to grave sources of danger now present to my patient, which, with skill and carefulness on my part, will itself add no new material dangers, and which will prevent with certainty, in the event of recovery, the entailing of diseased conditions which are probable in the same event without it? The most approved methods of treatment have failed to arrest the course of the disease. There is a steady progression in its gravity. A possibility exists, however, that even at the last moment a favorable turn may take place and recovery follow. In all probability, nevertheless, it will steadily advance to a fatal termination. Shall I now give him the benefit of tracheotomy, with its unquestioned advantages, or shall I wait yet longer? Each hour of waiting now will lessen rapidly the hopes which even tracheotomy affords. What is my duty to my patient? What other answer can there be than that *justice to my patient, justice to myself, fidelity to the profession I represent, all unite in demanding that now, early, before the development of conditions which will make any interference but a forlorn hope, tracheotomy should be done!* In thus answering this question, I wish it distinctly understood that I do not advocate hasty and indiscriminate operations. It is not to the exclusion of other treatment that tracheotomy is advocated; but when, despite our best efforts to the contrary, the case continues to increase in severity, or to remain with its already developed severity unmitigated; when, in view of all past experience, we have little to expect but its passing from bad to worse—then it is that tracheotomy is imperative. It would be idle to attempt a description of the symptoms which indicate that a case has reached the stage thus described. No one symptom constitutes its pathognomonic feature. No two cases will be alike. All the elements of a given case must be considered. A physician by whom a case has been studied in this way will rarely be compelled to wait until his patient is *in articulo mortis*, before he can perceive its hopelessness.

In concluding this estimate of the proper place in the treatment of croup to be assigned to tracheotomy, attention is directed to the fact that for every conclusion the facts upon which it is based have been given, and each fact or set of facts has been followed to its logical conclusion. If the conclusions are wrong, it is because of an error in the facts. The closest criticism of the statements made is invited—a criticism in all fairness and candor—for it is the truth only that is sought. If that which has been presented in this report is true, then the conclusions reached are of living interest to Brooklyn's practitioners not only, but also to all its people, so many of whom this day are cherishing the memory of children needlessly lost.

Another consideration must not be overlooked—one ever present, and very proper, which must influence a physician as to the readiness with which he will have recourse to tracheotomy—viz., the confidence or lack of confidence which he may have in his own knowledge of the operation, and in his skill as an operator. Only by familiar knowledge and great skillfulness can he hope to insure to his patient the full benefit of the operation which he proposes. If he feels that he has not these, he cannot be blamed for declining to exchange the dangers now present for those he knows not of. But when his patient is already in the last extremity, not even distrust of himself can he plead as an excuse for refusing to do his utmost to rescue his patient from his peril. Skill in operating is of vital importance in tracheotomy. He errs who thinks it a minor operation in surgery, or that the responsibility of its performance is a thing to be lightly assumed. But he errs quite as seriously who, because it is a heavy responsibility, will therefore decline it altogether, and will lightly and jauntily dismiss it to the limbo of exploded procedures. The nearly two-score names, the results of whose operations in this city are recorded in this report, prove that this responsibility is accepted by many. That they have the knowledge and skill requisite for its discharge is shown by the proportion of recoveries which they have secured—a proportion equal to that claimed by the most eminent tracheotomist of the metropolis.*

The sad circumstances which attended the last illness and death of one of the youngest of our number,† to do honor to whose memory so many of us gathered a few days since, lend a peculiar interest to this theme at this time. Animated by enthusiasm for his calling and devotion to the interests of his patient, he did not hesitate to jeopardize his own life in his efforts for its relief. He died! One more name added to the long list of moral heroes, the pride of our profession, who, unsupported by the excitement of the battle-field, unstimulated by hope of public applause, often not even appreciated for their efforts by those for whom they labor, have gone forward in the discharge of duty, aware of peril, but regarding it not, till overtaken by death.

This divine enthusiasm, this wonderful heroism, is the peculiar birth-right of the true physician. What a wonderful tribute to the nobility of our profession is the acceptance upon the part of the public of such devotion as a matter of course! It is this alone which, in the great majority of

* A. Jacobi, Medical Record, 1877, p. 109.

† Dr. N. G. Hutchison, died April 9, 1877, aged 24 years, from diphtheria, contracted by assiduous watching at the bedside of a child suffering from diphtheritic croup, for whose relief he had performed tracheotomy.

cases, incites him who has to battle with croup. Born of poverty and its inevitable accessories, this disease rarely holds out any other reward to the physician in its treatment than a consciousness of a good deed done. In this report the effort has been made to increase the responsibility of the physician in the treatment of this disease. Gratuitous, often perilous labor will result from the acceptance of its conclusions. But lives will be saved; and if but one useful life is saved that would otherwise have been sacrificed, the consciousness of having contributed to such a result will be reward enough for whatever labor the preparation of this report has cost.

4 Monroe St., Brooklyn, N. Y.

