Whooping Cough
Its natural Treatment
(being Thesis presented for depe. of M.D.)

by

[Signature]

of the Edin.

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WHOOPING-COUGH
ITS NATURE & TREATMENT

Whooping-cough is a disease which strikes me as well worthy of consideration, not only by reason of its extensive prevalence, but also on account of the high mortality resulting from its operation. The affection is one which appears at present to be regarded with resignation & composure - if not with indifference. It seems almost to be accepted that whooping cough must be appeased year by year, by the sacrifice of a large number of infants, & whilst the ravages of malignant growths of various kinds & of tuberculosis are constantly deplored, probably since affecting the community at all ages - this disorder, being confined for the most part to young children - when mortality from many causes is so high - is allowed to operate as though it were irresistible. A few statistics indicating the part played by the disease as a life destroying agent, may be instructive.

According to the Registrar General's Reports for the 10 years 1880 - 1889 inclusive no fewer than 61,468 deaths occurred from whooping cough in England or 1/48th. of the deaths from all causes.

In Wednesbury - the town in which I practise - during the same 10 years 127 deaths resulted from whooping cough or rather less than 1/37 of the deaths from all causes.

During 6 years 1875 - 1880 inclusive 1/40 of the deaths from all causes resulted from whooping cough - A consideration of these figures makes more clear the importance of the subject we are discussing.
The title of this paper makes it clear that it is not proposed to deal with the subject of whooping cough in all its aspects. Thus symptomatology, diagnosis, & prognosis are not considered, since I have nothing to add to the full account of these divisions of the subject to be found in any leading work on medicine - such divisions frequently receiving attention to the exclusion in the main of pathology & treatment, which to my mind constitute the most important & profitable field for enquiry.

**DEFINITION.**

Whooping Cough is a spasmodic infectious affection, caused by a localized specific inflammation of the respiratory tract in an area superior to the larynx.

From this definition will be seen the position that I intend to take with regard to the disease. While not wishing to attribute a false position to this affection, in the pathological series, I have nevertheless been led to look upon Whooping Cough as possessed of features which render it peculiar, & as resembling the typical zymotic diseases in some respects, while different from them in others. Again although certain of its characteristics would seem to refer whooping cough to the category of nervous diseases, it can I think by no means be regarded as a neurosis.
At the outset we have to consider the characteristic cough, although it is not my intention to elaborate any view concerning its peculiarities or the mode of its production. In this direction I will go no further than to record the fact that the "Whoop" which gives the disease its nature is not a constant symptom. Neither do I consider that it is one which calls for prolonged notice. It is valuable when present as a diagnostic of the disease, but otherwise does not appear to be of much importance. This much however is probable, that the disease does not occur unaccompanied by cough. To go a step farther, the cough must certainly result from nerve irritation, & a very important point to determine is the situation in which this irritation mainly or entirely operates. Thus at the outset I am confronted by a number of diverse views. It is necessary that these should receive consideration & at the same time that I should indicate my own view upon this point.

Trousseau gives no opinion as to the seat of the disease, but says that its specificity points to a germ as producing the disease - He mentions the specific pulmonary catarrh.

Broussais and Guersant believe the essential seat of the disease to be mainly in the bronchi -

Gendrin thinks the laryngo - pharyngeal mucous crypts are the seat of the affection.
Dean thinks the hyper-aesthetic catarrh is limited to the larynx.

Noel Guéneau de Mussy says the spasm is due to irritation of the vagus, resulting from enlargement of the bronchial lymphatic glands. This view has been shown to be erroneous after exhaustive investigation. The glandular enlargement is by no means constant in Whooping Cough, and many conditions are met with in which the bronchial lymphatic glands are enlarged without the occurrence of cough.

Squire in an article contributed by him to Quain’s Dictionary of Medicine, inclines to the idea that the most striking evidence of the disease is to be found below the glottis.

It is suggested in Hilton Pagge’s work on Medicine edited by Pye-Smith, that possibly during the prodromal stage, the poison of the disease having entered the air passages and set up a catarrh, may then be conveyed to some part of the central nervous system, thus producing the peculiar spasmodic cough.

An analogy is suggested between the poison of Whooping Cough and that of Hydrophobia—an idea which he thinks is strengthened by the absence of pyrexia during the existence of the disease in its most typical form—a phenomenon which also obtains in the case of hydrophobia. In this way he attempts to reconcile the absence of pyrexia with the view that whooping-cough
is a true Zymotic disease.

According to Rossbach (Berl : Klin : Wochenschrift 1880) no morbid change is discoverable either in the larynx or in the upper part of the trachea.

According to Meyer - Huni (Zeitschrift : f : Klin : Med : 1880) there is marked reddening & even slight swelling of most parts of the larynx (but not of the cords) as well as of the trachea.

The various views to which I have just briefly alluded are sufficient to make clear the difficulty that has been encountered in determining the exact seat of the affection, & at the same time indicate a tendency on the part of most observers to refer it to the upper air passages. The mistake made by most of them is I venture to think that they endeavour to localize the affected area too minutely. I certainly incline to their view in so far as they refer the disease to the upper portion of the respiratory tract, but at the same time see no grounds to justify us in fixing upon any specially restricted area.

My own view is that the seat of simple uncomplicated Whooping - Cough is the tract lying between the posterior nares and the rima glottidis - my reason for so thinking being that purely local treatment directed to this portion of the respiratory tract is sufficient to destroy the disease. Probably the ary - epiglottidean folds are
involved by the affection. This idea is strengthened by the similarity which appears to exist between the nocturnal cough of whooping-cough & the troublesome cough noticed in laryngeal phthisis at the stage when we observe infiltration and tumefaction of the arytaenoids. In the middle of last year I had under treatment a case of phthisis in which the larynx was observed to be in a condition of early tubercular involvement. The most distressing symptom was the paroxysmal cough. No disintegration had commenced, the stage associated with dysphagia had not arrived and the only thing to be observed was the pale tumescent condition of the arytaenoids. The cough struck me as connected in its character & in its mode of production with that of whooping cough. It was paroxysmal, uncontrollable & made up of a long series of very rapidly produced expirations. Further it was most frequently excited when the patient lay down. In both respects it will thus be seen that the cough resembled whooping-cough. The nocturnal character of this cough is of course familiar to all who have observed the disease. The fact that the cough is worse by night doubtless depends upon the fact that the child is then lying down. The reason in each of the cases I have mentioned seems to be that the secretion due to the accompanying morbid change, gravitates to the back of the throat, falls on the irritable arytaenoids &
so excites a paroxysm of coughing.

I may here add that the frequency with which vomiting occurs in the course of the disease, suggests the probability of the contagium to some extent involving the mucous membrane of the fauces. It appears to me as highly probable that the limitation of the disease at the lowest point I have indicated, is to be accounted for by the structure of the laryngeal lining which is thus described in Quain's Anatomy 9th. Edition Vol. ii. *the laryngeal mucous membrane is thin & of pale colour. In some situations it adheres intimately to the subjacent parts, especially on the epiglottis; and still more in passing over the true vocal cords, on which it is very thin & most closely adherent. About the upper part of the larynx above the glottis, it is extremely sensitive. In and near the ary-epiglottidean folds, it covers a quantity of loose areolar tissue, which is liable in disease to infiltration, constituting edema of the glottis *

This it is I take it which determines the downward limitation of the essential lesion of whooping cough, in its simple uncomplicated form. Further the characters of the membrane over the ary-epiglottidean folds, with the subjacent areolar tissue are just those which might be expected to afford a nidus for the disease. It is the gravitation of mucous secretion on to these folds when the patient assumes the recumbent posture, which to
my mind furnishes an explanation of the nocturnal aggravation of the cough so constantly met with. I am not aware that any sufficient reasons have been adduced for limiting the special seat of the disorder to a greater extent than I have indicated.

Coming now to the consideration of the nature of the morbid process, there seems to be a marked agreement that we have to deal with a zymosis - and that the disease is to be classed with the zymotic diseases. We must pause here to consider the meaning of the term Zymotic. Dr. Farr in a letter to the Registrar General in 1842, introduced this word, so far as can be ascertained for the first time. In 1856 in the 16th. Annual Report of the Registrar General - Dr. Farr described the diseases of the zymotic class as referable to 4 groups.

(1) The miasmatic - diffusible through the air or water, & attended by fevers of various kinds.

(2) The enthetic or contagious, communicated by contact, puncture or inoculation.

(3) The Diabetic which arise when the blood is supplied with improper or bad food.

(4) The parasitic attacking especially dirty populations & infesting the skin, intestinal tract & other structures of the body.

Recently the term zymotic has been restricted to the acute specific diseases, included under the first group - miasmatic. It is in this sense that it is now
employed. It is convenient to employ the term "Zyme" as indicating the miasm upon which the zymotic disease depends, particularly because it does not imply the acceptance of any particular theory of disease. There is practical unanimity as to the zymotic nature of whooping cough in this sense - but it is equally certain that up to the present time, the precise nature of the poison producing the disease is unknown. In a work by Flugge - entitled "Micro-organisms" - "Etiology of the infective diseases" published by the new Sydenham Society 1890, we find at page 297 "Letzerich looks upon the infective agents as cocci, & Burger as short rods often constricted in the middle, & present in the sputum of the patient, nevertheless there is no sufficient support for either of these views." In 1867 Poulet is said to have found in the moisture of patients suffering from whooping cough what were then termed infusoria, belonging to the class bacterium bacillus.

Binz also believed that the disease depended upon the reception and further development of some form of fungus. He ordered quinine in the hope that it might act upon the spores of the fungus, whilst circulating in the blood.

Dolan (Whooping - Cough - Its Pathology & treatment by Thomas M. Dolan 1882) failed in reproducing the disease, by injecting blood of whooping - cough patients
into rabbits, but killed rabbits by injecting nasal secretion from persons suffering from the disease. Further he killed rabbits by inoculating with nasal & pulmonary secretion from rabbits previously inoculated from human beings. In Dolan's various experiments, the sputa exerted a poisonous influence, whereas the blood did not do so. In this direction at present we can go no farther. From what however has been said in this connection, it will be seen how much remains to be done in the way of determining the nature of the poison & its behaviour after its entrance into the system.

Leaving the question of the precise nature of the contagium, we come to consider the mode of its entrance into the system. We must enquire whether the poison is at the outset grafted upon the mucous membrane of the air-passages, or whether it enters the blood in the first place, & comes secondarily to affect the respiratory mucous membrane. This brings up the position to be assigned to whooping-cough in relation to zymotic diseases. Dolan argues in favor of regarding the affection as in all respects a typical zymotic disease, in the same sense as the specific fevers. He says "there are constitutional symptoms before the development of the pulmonary symptoms". He holds the view that the virus is first taken up by the blood, & subsequently manifests itself in the lungs - just as the bacilli become deposited in the spleen in splenic fever. On the ground of
analogy, he considers whooping - cough affects the blood in the same way as the virus of scarlatina & measles. So far as my own observation goes, I have not been able to perceive symptoms before the occurrence of the catarrh, neither am I acquainted with definite evidence supporting such an idea. Concerning the next point, I do not feel able to accept argument from analogy, where infective processes are concerned. Each disease presents certain peculiarities, & it is by no means safe to assume that the virus of whooping - cough & that of splenic fever affect the system through parallel channels. Doubtless whooping - cough is a zymotic disease, but it does not follow that it affects the system at large. I regard whooping - cough as a localised specific zymosis, as may be seen from the definition of the disease given at the outset of this paper. In this connection there occurs to one's mind the strong similarities & yet wide & essential differences subsisting between two such conditions as epithelioma and rodent ulcer. In many particulars they are scarcely distinguishable from one another. Their main points of divergence are the slow growth and local character of rodent ulcer, contrasting with the marked tendency to secondary deposit & the comparatively rapid extension of the epithelioma. If however these points be left out of consideration, the two conditions might be regarded as belonging to the same class of disease.
Equally Scarlatina and whooping - cough may be looked upon as Zymotic, but it does not follow that they are equally far reaching in their effects. Who would say that whooping - cough is as malignant as Scarlatina? And may not this difference depend upon the more definite localisation of the one disorder as compared with the other? It is one thing to show that whooping cough is a Zymotic disease, but having done so, we are not at liberty to conclude that its poison exerts its effects through the same channels as does the poison of Scarlatina. The Zymotic nature of whooping - cough cannot be doubted, since it has in common with them, almost every characteristic belonging to that class of diseases. But then we must remember that the term "Zymotic" is not applied to a disease because as a matter of necessity it enters the blood. I take it that the term denotes a disease which depends for its occurrence upon the existence of a "zyme", which, when deposited in a suitable nidus, is capable of reproducing itself in its new sphere. In this sense then whooping - cough is undoubtedly zymotic, but does not as a necessary consequence pervade all the tissues of an organism affected by the poison. Dolan dwells upon the absence of any specific treatment in whooping - cough, and urges that in this respect the disease resembles the other zymotic affections - such as Scarlatina & Measles. On the other hand it is the very
fact that local antiseptic treatment is almost specific in its action that goes so far to strengthen me in my dissent from Dolan's view as to whooping - cough being primarily a blood disease. He goes on to express the view that having entered the blood, the germs set up constitutional disturbance, & then attack the pulmonary epithelium, so giving rise to the phenomena characteristic of the disease. Of course a view such as this, is essentially hypothetical - and moreover it would seem to be opposed by certain features of the disease to which reference will shortly be made. Let it once be established that the views of whooping - cough can be destroyed by purely local treatment, and we shall feel some justification for regarding the disease as a local rather than as a constitutional disease. Several points in the history of whooping - cough demand attention.

(1) The absence of pyrexia in simple uncomplicated cases.

(2) The long duration of the disease.

(3) The character of the complications.

With regard to the temperature of patients suffering from whooping - cough, little can be gathered from any of the works I have consulted; the main reason no doubt being that in simple uncomplicated cases of the disease, the temperature is unaffected to any marked extent. It is instructive to note here that Wunderlich in his exhaustive work on "Medical Thermometry" published by the
New Sydenham Society in 1871 - though dealing so particularly with most diseases, & especially with the temperatures met with in zymotic diseases, makes no mention of any special disturbance of temperature as occurring in whooping cough. The only reference he makes to the disease at all, occurs under the head of "temperature in catarrhal affections" & he merely says that "rise of temperature in catarrhal conditions generally denotes the advent of complications & more particularly is this the case in whooping cough". From a statement such as this, we may fairly conclude that Wunderlich observed no definite or regular elevation of temperature in simple cases, & that he considers such when it occurs, as indicative of some super-added trouble. More than this, we must not forget that in children, a very slight cause is sufficient to produce an elevation of temperature. We are aware how a trivial catarrh or the appearance of a tooth may be accompanied by marked pyrexia. If therefore it can be shown that whooping cough is not of necessity or as a rule accompanied by pyrexia, it is fair to assume that the system as a whole is not much affected. Dolan goes so far as to say that of the cases of the disease he has met with in adults, they have never been complicated by other diseases. In Hilton Fagge's Work on Medicine edited by Pye - Smith, the prodromal stage of whooping cough is said to be marked by some pyrexia,
but the stage of whooping-cough proper when uncomplicated to be unaccompanied by rise of temperature.

In the case of what other zymotic disease is there such a striking absence of pyrexia as to find no mention in such a work as that by Wunderlich? Of course when complications ensue — i.e. when conditions essentially foreign to the simple disease arise — disturbances of temperature occur — but in all the ordinary constitutional diseases, we regularly encounter rises in temperature, more or less characteristic even when there is no complication whatever. Delan in his treatise upon whooping-cough Chap. 1. § 7 summarises his view as to the disease being a zymotic in the same sense as scarlatina and typhoid. He there says: "looking at all the phenomena & symptoms in their entirety, whooping-cough presents certain resemblances to the zymotic diseases. The very absence of morbid anatomical primary changes favors this view, the rash & sore throat of scarlatina, the petechiae and Peyer patches ulceration of typhoid fever, are pathognomonic of these diseases.

Whooping cough has its obstructive feature, the singular morbid paroxysmal cough — the "kink or whoop" with the secondary ulceration of the frænum linguae are pathognomonic of it. Admitting a contagium virum, we fall back upon the group of schizomycetes which are the fœset origo mali in other diseases, and thus we can explain satisfactorily its infective nature and all the
other phenomena attending it."

I can only say that I know of no objection to the classification of whooping-cough as a fungoid disease, as advocated by Dolan, but must express my dissent, when he places the affection in the same category as typhoid fever and scarlatina - or at any rate exception must be taken to the grounds upon which he bases the arrangement. What possible parallelism is there between the sore throat and rash of scarlatina and the whoop of whooping-cough with ulceration of the fraenum linguae? or between these conditions and the ulceration of Peyer's patches occurring in typhoid fever? So far as regards the ulceration of the fraenum linguae, Dolan distinctly expresses his opinion (Chap. I. § 13.) that the condition is mechanically produced by the teeth, & characterises as an example of hasty generalisation from insufficient premisses, the view of M. Delthil of the condition being specific in the same sense as is the chancre of syphilis. I am not aware whether he compares the whoop to the sore throat occurring in scarlatina or to the rash. In either case however Dolan is drawing an analogy between a symptom of the one disease & a physical sign of the other, a procedure which from my point of view is altogether without force or meaning. How he can possibly see any parallelism between the symptomatic cough & the mechanically produced ulceration of the fraenum linguae occurring
in whooping cough & the well marked anatomical changes already noted as occurring in scarlatina or typhoid fever is more than I can understand. In his anxiety to bracket whooping cough with these affections and to make the disease a typical zymotic, Dolan proves too much.

To my mind a careful study of the various phenomena to be noted in the affection, shows us that in some of its features the disease strongly resembles those belonging to the regular zymotic group; but that in others it is separated from that group. In that it is highly infectious and it depends upon a specific poison or contagium, in that it has a period of attack & decline, & that it rarely attacks a patient but once, it would seem that whooping cough is to be regarded as a zymotic. On the other hand the absence of any definite anatomical changes such as the rash of the exanthemata, the throat changes occurring in scarlatina or diphtheria, the ulceration of Peyer's patches observed in enteric fever, or the petechiae of typhus together with the absence of any well marked & typical pyrexia such as occurs in all those affections - induces me to regard the disease as separated from the typical and familiar group of zymotic diseases. Two other points strengthen me in the adoption of this view - viz : -the amenability of the affection to purely local treatment when adopted in the early, uncomplicated stage, and the peculiar character of the complications, reference to which will shortly be made.
The duration of the disease deserves notice, since zymotic affections ordinarily run a well marked & tollerably constant course, but in whooping cough no such definite course is observed. An attack may be passed through and have disappeared in from ten to fourteen days, or may extend over as long a period as 2 or even 3 months. Local treatment if perseveringly adopted, will I firmly believe effect a disappearance of the malady within 3 weeks in almost every case. To this matter however allusion will be made later.

I now come to consider the complications met with in the disease; & here it is interesting to observe the position taken by Henoch with regard to the affection, in his masterly treatise on Children's diseases published by the Sydenham Society (Lectures on Children's diseases - Henoch, New Sydenham Society 1389). He says "although I close my account of the respiratory diseases with a description of whooping - cough, I am perfectly well aware that it does not really belong to this section, but indubitably that of the infectious diseases, nevertheless I consider it expedient from a clinical point of view to treat of whooping - cough immediately after the diseases of the respiratory organs, because its symptoms & its most serious complications belong mainly to this system." Such a statement exemplifies pretty clearly the position I take upon the subject.

With regard to complications of the disease, I may
first mention some which are merely incidental to the disease, but which add materially nevertheless to the danger of the malady and increase the difficulties to be overcome in its treatment. Many arise from the constantly recurring engorgement of vessels, resulting from the impaired respiration and circulation - such as exhausting attacks of epistaxis - the bloody sputa due to bronchial haemorrhage - as also ecchymoses under the conjunctivae. Mention is made by Henoch of various other conditions ensuing upon the venous engorgement occurring during paroxysms of the cough. Convulsions of greater or lesser degree may arise in the course of whooping - cough. I strongly incline to the view taken of the mode of their production by Henoch, who says he has met with them in severe cases of the disease, where cyanosis has been marked owing to the violence of the cough. He holds that they result either from the continuous venous engorgement of the brain or from the accumulation of carbonic acid in the blood. Such convulsions may be general & fatal, or may take the form of localised spasmodic contractions (e.g. squinting of the eyes, contractures of the fingers, toes, arms &c.) He further says that brain symptoms may also be caused by frequent repetition of the severe attacks, which so much interfere with the excretion of carbonic acid. By persisting in the intervals such trouble may cause death with symptoms resembling those
of meningitis. The commonest complication of the disease is bronchial catarrh, which tends to become diffuse & to merge into broncho-pneumonia, there may also occur — though comparatively rarely — croupous pneumonia & pleurisy. Emphysema is a very common condition affecting the apices & margins, more particularly when there is pneumatic consolidation. Rupture of the air vesicles followed by pneumo-thorax has been met with by Roger (recherches cliniques sur les maladies de l'enfance II Paris 1883 p.554)

Pneumonia occurring in whooping cough has a tendency to become chronic & then later we may have to deal with phthisis. The protracted bronchial catarrh tends to produce caseation & enlargement of the bronchial lymphatic glands. In this way is produced the miliary tuberculosis or tubercular meningitis met with in the disease, & sometimes at periods remote from the attack.

Enostische tumours enlarge. When stomatitis is present, haemorrhage may occur from the inflamed gums. Henoch says that in one child who had eczema of the ear, he saw bleeding take place from the affected area of skin, during every severe attack. Haemorrhage may occur from the outer ear due to rupture of the tympanum, caused by the force with which air is driven through the Eustachian tube into the tympanic cavity. Barrier observed a haemorrhage between the duramater & the arachnoid as
the result of a paroxysm. Henoch also narrates a case (op. Cit) which seemed to be one of hemiplegia due to cerebral haemorrhage occurring during an attack of whooping cough. From the violence of the forcible expiration, hernia & protrusus and not infrequently occur. Cadet described a case of rupture of the rectus abdominis with the formation of haematoma under the skin of the abdomen, which underwent gradual resolution. The foregoing comprise the most important of the complications of whooping cough, & it will be observed that they may be arranged in two main groups -

(1) Diseases which are produced mechanically, such as the haemorrhages - and due to mechanical disturbances of the circulation & respiration.

(2) Diseases occurring at various points in the respiratory tract.

Regarding the nervous complications, I agree most fully with Henoch, as to the mode of their production. They properly speaking should be included in class 1, since they are presumably due to the mechanically produced venous engorgements, resulting in loading of the blood with carbonic acid. Thus the very nature of the complications would appear to support the localised nature of the affection. This is the point which I have wished to bring out in a consideration of the complications of the affection such as the foregoing. I am not aware in the case of any of the other constitutional
zymotic affections that any similar limitation occurs in connection with secondary complicating changes.

Reference must be made to Squire's view of the disease. As already stated, he has written an article upon this subject in Quain's Dictionary of Medicine 1888 - and there speaks of "a specific catarrh accompanied by hyper-esthesia". Doubtless hyper-esthesia exists, but such a condition is not peculiar to whooping cough. I think there can be no doubt as to the existence of a similar hyper-esthesia in certain chronic forms of rhinitis. Cohen in his work upon "diseases of the throat" speaks of submucous infiltration of the sides of the vomer, & says that in one such case there was abundant evidence of mycelium. Again Meyer of Copenhagen treats of Adenoid vegetations of the naso-pharyngeal cavity, which of course most practitioners are now called upon to remove from time to time, since their occurrence has been definitely ascertained. As to cough in the former condition I cannot speak, but it is one of the most troublesome features of post-nasal growths & a constant accompaniment of that affection. In these morbid states, a hyper-esthesia of the diseased area exists, & spasmodic & uncontrollable cough very similar to whooping cough may be met with. As an instance, I may cite the case of B.W. astat 6 years, who was under treatment repeatedly for cough, altogether independent of any chest condition.
There was some expectoration of clear, glairy mucus, and he suffered constantly from nasal catarrh. Ordinary remedies were without effect upon the cough, which varied in intensity, but never disappeared. A well marked attack of whooping cough was grafted on to the existing condition, but yielded to treatment. The original cough persisted and was only cured by removing the enlarged tonsils & a number of post-nasal adenoid growths. There was great similarity in this case between the cough resulting from the adenomata & that due to whooping cough.

Squire says the explanation of the spasm is by the specific or contagious element. He speaks of bacteria and micrococci as occurring in the expectoration in whooping cough, but says they seem merely to differ from those of ordinary occurrence in their number and rapidity of increase. He further says that these bodies have ceased to be local before the signs of the disease are observed. He then goes on to detail the post mortem appearances and speaks of the absence of faucial congestion & of the greater redness of the mucous membrane below than above the glottis - of the pale trachea and injected bronchi, & of the sticky masses of mucus containing micrococci & located in the bronchi extending from these onward to the alveoli. Is such a view of the disease, I would ask, consistent with the fact that purely local medication is sufficient to arrest the disease in 21 days or so after it has become thoroughly
established? With regard to the post mortem appearances, I think they are very open to misinterpretation. Let us take another disease of the respiratory tract - catarrhal pneumonia - Do we not know as practical men that this disease may quite well commence as an ordinary simple catarrh, which being neglected spreads downwards, becoming in turn a tracheitis, bronchitis & pneumonia? Do we not in catarrhal pneumonia equally find viscid secretion in the bronchi - this secretion also laden with micrococci? Let us not be led away too much by post mortem appearances, which of course are as a rule only observed in the most virulent attacks of the disorder, which are surrounded by conditions the outcome of complications foreign to whooping cough pure & simple, & common to ordinary affections of the respiratory tract. Rather let us endeavour to strip the condition of these secondary manifestations & examine the milder cases, as being far more instructive since free from complications, & which do not become the subject of post mortem examination. What shall we say concerning a large proportion of the cases of whooping cough noted in an epidemic, which never show signs of bronchitis or any other chest trouble? My observation of a large number of cases of the affection, during a recent epidemic, leads me to conclude that the majority pass through an attack without manifesting any grave complications.
It must be borne in mind that all writers on whooping cough dwell upon the first stage of the disease as being essentially catarrhal, & they allude to the occurrence of sneezing, thus clearly meaning that the catarrh at this time is naso-pharyngeal. But then what happens? The catarrh pure & simple is over, & then the true spasmodic stage is inaugurated. And what more natural than that we should get this paroxysmal stage? The organisms which were primarily situated in the nasopharynx, have gradually travelled down and come to irritate the epiglottis & upper part of the laryngeal orifice. Such a hypothesis seems to me to call for little explanation. Why do authors pass straight from the catarrh characterising the first stage, & go on to speak next of bronchial catarrh as an almost invariable feature of the disorder? Squire says "at this time laryngoscopic examination has shown the mucous membrane pale to the lower third of the trachea, before the cough whitish mucus has been seen to rise to the bifurcation of the trachea, & then cough begins. Some time after it is over, the vocal cords have been observed redder than before. Bronchial catarrh is as much a feature of this stage as the spasm. When the cough seems to have come on without cause, the secretion has risen to the trachea. Such an account is to me unintelligible. In the first place why are we to imagine that a disease which at its outset is admittedly catarrhal & situated at the upper
part of the air passages, should next manifest itself as a bronchial catarrh, having in so doing passed over the intervening tissue between the naso-pharynx and the bronchial tubes leaving it unaffected? How can it reach the bronchial tubes except by continuity of tissue - and if it must pass straight down to the tubes, what peculiarities of structure can be adduced as possessed by that intervening portion of tissue to explain its exemption from attack? With regard to the absence of marked reddening of the vocal cords & upper portion of the trachea there can I venture to think be little doubt that an amount of irritation which is sufficient to cause reddening & thickening of the thicker & softer tissues at the upper part of the passages is not sufficiently powerful to cause perceptible reddening & thickening at the upper orifice of the larynx, where the submucosa is much less well marked. To explain the paroxysmal cough Squire says "before the cough, whitish mucus has been seen to rise to the bifurcation of the trachea". I am inclined to look in another direction for the true explanation. I take it that at this time we have a constant irritation in the mucous membrane of the naso-pharynx, epiglottis and arytenoids - that such irritation is tolerated for some time, but that ultimately the process of the summation of stimuli comes into play, & the repeated stimulation of the laryngeal nerve endings brings about expulsive efforts in the nature of spasmodic
expirations, giving to this stage its characteristic features. The nerves then become exhausted and for a time cease to respond to the stimulation, until the process is again repeated, when the paroxysmal cough again takes place - the cycle being again & again enacted. Thus we may explain the child's terror at the irresistible approach of the cough, which is felt to be drawing nearer & nearer. How can the rising of mucous to the bifurcation of the bronchi be supposed to cause the spasmodic cough peculiar to the disease? Why does not the mucous similarly rising in ordinary bronchitis give rise also to such a cough? I do not think that the mucous has anything to do with the peculiar character of the cough, which depends apparently rather upon prolonged nerve irritation.

Whooping - cough regarded as a nervous disease.

We must not lose sight of the fact that whooping cough has by certain writers of eminence been regarded as a nervous disease. Amongst such one is led to refer specially to Octavius Sturges, who published a Lecture upon whooping - cough, delivered by him at the Westminster Hospital. It appeared in 1877 with Lectures upon Chorea in a small book entitled "Chorea & Whooping Cough" Five Lectures by Octavius Sturges". The subject is argued with much skill & ingenuity, & the object aimed at is to prove that whooping cough is essentially a neurosis.
He compares the disease to spasmodic asthma, which he says often in later life, takes the place of whooping cough. What possible connection he can perceive between the two diseases, I am altogether at a loss to perceive—and in what way he has seen the one disease replaced by the other, he does not trouble to indicate. As witness to the truly nervous origin of the disease, he points to the recurring nocturnal dyspnæa, which he considers often ushers in, and then becomes lost in the disease. He then passes on to speak of the strictly periodic character of the paroxysms observed in many cases. Sir H. Holland (Medical notes & reflections p. 342) would seem to advocate the same view when he says "the whooping cough however different in its nature and cause from epilepsy furnishes a curious example of intermittent spasmodic actions tending to like intervals & these often of considerable length. When no causal irritation is present to provoke the fit, and more especially perhaps when the disorder is declining, it is remarkable how regular the times of seizure occasionally become, retaining the periodical character even to the last! With regard to these points, I have already expressed my opinion. The view I have previously stated as to the dependence of the periodically occurring paroxysm upon the operation of a physiological law—that of the summation of stimuli—appears to me a much more defi-
nique & satisfactory explanation of the phenomenon. I do not feel that Sturges strengthens his hypothesis, when he goes on to say, witness the control exercised by the mind, so that "by admonition & still more by threats the coughing fits can be held in some check." Would it not appear to anyone that a paroxysm of whooping cough is just such a manifestation as is capable of a certain degree of inhibition? Since however as the result of threat, the intervals between the paroxysms can be prolonged, are we in the least degree justified in supposing that there is no well marked physical condition operating to produce the cough? I feel that it would be quite as reasonable to argue that a child's desire to micturate is a purely nervous sensation, because it is possible by means of threats, to cause the child to inhibit the act for a shorter or longer time. And then Sturges says, as if feeling the weakness of his position, "but in all this, we do but increase our difficulties. We have to regard the disease in its entirety......................By as much as we make it probable that whooping cough is apt to be excited by external stimulation, & when excited to exhibit the particular phenomena which we see, owing to the pattern of the childish framework, by just so much do we exclude & render unaccountable those other features of the disease which seem to link it with contagious fevers". The obvious comment upon such a sentence is that if the
paroxysms are under the control of the child, & depend so largely for their production upon external stimulation how comes it that in almost every case, the paroxysms are distinctly more frequent by night than by day? If Sturges' view were correct, one would expect that when the child's emotions were no longer excited, & external stimulation, in the main ceased to operate - as is the case during sleep by night - the attacks would be less frequent than by day. On the other hand everyone who has been brought much into contact with the disease, knows that the nocturnal aggravation of the cough is a valuable and reliable diagnostic, - whooping cough in this respect differing from most other forms of cough. A possible cause of the greater frequency of the cough by night has already been suggested. Sturges indulges later in a laboured & ineffectual attempt to strengthen the position of whooping cough as a nervous disease. He says - op cit - "although the numerous believers in the material conveyance of whooping cough, are in the habit of expressing themselves very positively on the subject, there is no one among ourselves, so far as I know, who has pointed out the place of residence of the poison, or the mode of its conveyance. It is otherwise in America. A writer in that country upon "consumption and its treatment" (Dr. Barr on consumption p.73) - enters -tains no doubt that the disease is conveyed in the
sputum, owing to the fact that children are apt to "cough in each others faces". We positively deny any other form of contagion in whooping cough. I do not propose "says Sturge" to avail myself of the authority of this writer, yet the investigation of contagion is so far advanced, that it will be soon necessary for those who adopt the material view of whooping cough, to be as explicit as he is, if less confident".

Dr. Edward Smith (Vol.XXXVII. Med : & chir : Transactions) says "the great similarity between whooping cough & chest diseases, contrasted with the dissimilarity between the former & zymotic affections, cannot fail to induce us to regard them as most closely allied, & may almost suffice to induce us to enquire if they are not in their morality the same disease". How very much is this the position taken up by numerous observers of the affection. How frequently has appeared this hesitation to regard the disease rather as a pure & simple chest affection on the one hand, or as a zymotic disease upon the other. My own feeling, as I hope will be clear from the foregoing pages, is that whooping cough is a zymotic - but not in the full & ordinary sense of that term, since not essentially a constitutional state, but rather a disease of the respiratory channels, since confined to those channels.
TREATMENT OF WHOOPING COUGH.

By most authors it would seem to be assumed that the treatment of this affection must of necessity be mainly empirical; and this is scarcely to be wondered at, when we remember the widely different views that have been held concerning its essential pathology. There are very few remedies, potent or inert, that have not at some time or other been tried — thus it has come to pass that while some persons of experience pin their faith to friction of the skin over the spinal column with oil of amber & old rum, others believe equally strongly in the judicious employment of castigation, Professor Niemeyer being, I believe, one of the most distinguished supporters of this plan. At the same time it may in all seriousness be said that almost all the chief drugs of the pharmacopoeia have at some time or other been employed and these include expectorants, sedatives, antispasmodics, escharotics, astringents, tonics, & antiseptics.

In such a work as Hilton Fagge's Medicine, edited & completed by Pye - Smith, the remarks upon treatment of whooping cough open thus "we have no specific or effectual treatment of whooping cough" — and such a statement may be taken, I think, as summing up the opinion of most authorities upon the subject. Under such circumstances, it is not surprising that a very large
number of remedies should have been tried; & there can be little doubt that a large proportion of them are absolutely without value. It has fallen to my lot to treat, in several epidemics of the disease, a large number of cases, & I am bound to say that I have been persistently disappointed with most internal remedies that I have tried. I will not make the sweeping statement that internal remedies are valueless in whooping cough, since the affection is so frequently complicated by other conditions, calling for special treatment - treatment however essentially distinct from that of the specific ailment. I propose now however to leave the consideration of these adventitious conditions, & simply to look at the treatment of the uncomplicated disease. The chief aim of the remedial agents employed, has naturally been to control the paroxysms of coughing, both as regards their severity & frequency.

In any attempt to restore cosmos out of the chaos of remedies that have from time to time been employed in combating the disease, we must consider them as belonging to one or other of the groups to which I have already alluded, & taking these seriatim, we note

(1) EXPECTORANTS. As to members of this group it may be said that they are chiefly used to assist in effecting the expulsion of the glairy, tenacious mucus which is alike so abundant & troublesome in the later
stages of many cases. Ipecacuanha, squill & tartar emetic are the chief drugs in this list. Sulphate of zinc may also be included, although by some men it has rather been employed as acting tonically upon the nerve centres.

(II) SEDATIVES. In this division a large number of remedies find a place, & have as their object to check the frequency & severity of the paroxysms of coughing, & perhaps to control the vomiting, which is so often both persistent and exhausting. Probably the drug most commonly used is belladonna - or its active alkaloid atropine. The tincture of belladonna in 2 or 3 minim doses, gradually raised to 5 or 6 minims - or solution of atropine - (P.B.) m. j. is strongly recommended by some. Dr. Eustace Smith combines the latter with sulphate of zinc (gr. 1/6 gradually increased) Trousseau insisted strongly upon the great value of belladonna, acting as a sedative to the nervous system. In fact the majority probably of those prescribing this drug, regard whooping cough as mainly troublesome by reason of its neurotic element. Trousseau emphasized particularly the importance of giving the remedy in one dose each morning - this sufficing for the 24 hours. In fact he went so far as to say that the remedy depends for its usefulness upon the adoption of this plan. I have frequently employed belladonna in the treatment of the disease & then usually
in combination with bromide of potassium but never limited its employment to the single morning dose. Possibly this fact explains my never having obtained any striking results. The bromides of potassium & ammonium here call for mention, & certainly I have sometimes felt that their use has resulted in improvement, though more often I have been disappointed. When used at all, they should be pushed, & in severe attacks of the malady it will be found that children will tolerate comparatively large doses. Chloral hydrate is useful when the cough prevents sleep. Hydrocyanic acid has been employed both to control the cough & to check vomiting, but needs to be used in very small doses, & with much caution, & careful supervision in the case of young children. Some writers have claimed value for conium - a remedy of which I have small experience. Croton - chloral has been tried, but does not seem now to be much used. Morphia is employed more or less, but does not seem to have any special value. I have used various preparations containing opium, & have been surprised to find how little effect has resulted, in the direction of diminished cough. The inhalation of chloroform was recommended by Kidd, Todd & C. J. B. Williams, with a view to arresting violent paroxysms of coughing occurring in the course of the disease.
(III) ANTISPASMODICS. Valerian - castoreum - musk & assafetida have been tried because of their antispasmodic action, but I am unacquainted with any systematized record of the results obtained, & have not had sufficient confidence in any of them, to give them a trial.

(IV.) ESCHAROTICS. It is only necessary to mention in this connection that blisters have been applied to the nape of the neck, with the idea of removing a supposed congestion of the upper tracts of the cord & medulla. Counter-irritation in various forms has been employed, not so much to influence the specific affection, as to control the bronchitis which is so apt to arise. The chief remedies so employed are croton oil - emplastrum lyttæ or spirit of turpentine.

(V) ASTRINGENTS. The late Dr. Golding Bird strongly recommended alum as an astringent in the later stages of the disease, & since his time various other authorities have maintained the value of the remedy. Ergot of rye has also found advocates.

(VI) Tonics of all kinds have been made use of & doubtless are extremely useful in dealing with the general vital depression so often met with in severe cases. Quinine, bark, arsenic & iron are the chief of these, & by some oxide of zinc has been recommended as a nerve tonic. Some years ago Dr. Gibb attached great value to the use of nitric acid internally in whooping
cough, & advised that it should be combined with bromide of ammonium. I have not been able to learn that disciples of this method abound at the present time.

(VII) ANTISEPTICS. Of late years the control of whooping cough has been attempted by the use of antiseptic remedies, acting either through the blood, or directly by means of inhalations & insufflations. The only agent of importance that has been employed to act through the blood is carbolic acid. This acid has played an extensive part in the treatment of the disease in some of our Hospitals, & certainly I have felt that improvement has sometimes followed its use. I have met Physicians who regard the remedy almost as a specific when given internally, but I am not able to go so far as this. Its dose for young children is about one third of a minim of the pure acid, gradually increased & given in water or combined with other remedies. A corresponding dose may also be given as the glycerine of carbolic acid. Carbolic acid has also been used in the form of inhalation, with the object of exerting a topical action upon the larynx, and atomised fluids of various kinds have been similarly used. In the British Medical Journal 1875 - Vol. ii. p.425, Lee published a paper on the treatment of whooping cough with Carbolic acid vapour, & the same remedy was recommended by Burchardt in 1874. Jeffries in the B. M. J. 1879 p.965 takes the same line. Lesser employed inhalations of petroleum, & Letzerich on the assumption that
the disease depended upon fungoid spores, recommended the inhalation of muriate of quinine, in the form of powder in combination with bicarbonate of soda & gum arabic. A reference to these methods will suffice to indicate the direction in which observers have looked of late years, for remedies with which to combat the disease. The treatment by means of carbolic acid spray was dwelt upon by Mackenzie as far back as 1865 and in 1868 Blake drew attention once more to this remedy. Many years ago tar-vapour & gas-lime emanations were regarded as valuable. As already stated Goodhart believe in the local use of resorcin applied to the lining of the larynx. Apart from antiseptic drugs, it may be mentioned that nitrate of silver solution has been painted upon the laryngeal lining, & apparently it is stated with good effect.

In 1850, in a paper styled "on the topical medication of the larynx" Ebenezer Watson advised that the throat should be brushed internally with a solution of nitrate of silver. In Ziemssen's Cyclopædia, Rehn is quoted as employing in 1866, inhalations of a solution of nitrate of silver at the height of the second stage. Brunich is there quoted as using compressed air; Clar recommended camphor and oil of turpentine - and Kjellberg of Stockholm, inhalations of benzine. The fact must not be overlooked that a number of the foregoing remedies may require to be employed in an attack
of whooping cough - some being used at one stage & some at another. Many have found their use in the catarrhal stage, to check the symptoms then observed, whilst a second series has been reserved for the stage characterized by the typical cough.

A third set again has been tried to exert a tonic effect during the tedious convalescence which so often follows the disease. It is here I think that there is needed definiteness of view with regard to the disease itself as opposed to the many complications & troubles that may call for treatment during an attack. No one I imagine, will deny that expectorants or sedatives or antiphlogistics may be called for during an attack of whooping cough. All I contend for is that we should avoid regarding these remedies as exerting a specific influence upon the cause of the malady. Before going on to express any more definite view in this connection, there is one method of treatment upon which I must dwell at somewhat greater length than upon any of the foregoing remedies viz:- The inhalation of the emanations from gas works. This is a plan that was much more in vogue formerly than at present, & is regarded apparently as worthy to be placed in the category of old women's remedies. Personally I must confess to a certain amount of respect for old women's tales & also for some of their remedies. I am not aware how far back the treatment by taking children to gas works, came into vogue, but certainly it
was in fashion 50 years ago, and Dolan says that the mothers declared that the paroxysms were shortened and that the children derived benefit from the air. Dolan himself seems to attach little importance to the treatment. Ziemasssen in his "Cyclopedia" gives the experience of various men who have tried the method. Thus Lochner is stated to have sent 43 children into the purifying chambers of a gas works, so that they could breathe the exhalations of the lime used in purifying the illuminating gas. Twenty-three boys & 20 girls were thus treated - & of these 11 were less than 1 year old. The results are said to have been for the most part favorable. Again Commenge sent 33 children to the gas works of St. Maud. Of these 54 were cured, 24 improved, while in 10 no result could be determined. Each sitting lasted about 2 hours, and each successful case required on an average 11 or 12 sittings. Maingault, Blanche, Bergeron, Borthez, Roger & Bouchut have declared against making this use of the gas works, partly from the want of results, & partly because they regarded these inhalations as hazardous. Now it will be noticed that the latter group of observers declare against, & Lochner & Commenge - for the treatment. The two last named carried the method out systematically, & if the reports may be relied upon, obtained favorable results. I have not been able to ascertain what the character of the experiments
was, of the experiments which led the other 6 observers to come to a conclusion unfavorable to the treatment. My own experience is that a reliable method is sometimes discarded either because the result is delayed or the treatment not systematically pursued. Thus I think it must have happened to most practitioners to have prescribed what may have been a suitable preparation, say for the local treatment of a case of eczema, & to have found that its apparent failure has depended upon the intermittent application of the remedy. The patient may apply the remedy upon going to bed - wash off the remains of it upon rising in the morning, & waiting until the following night before any further application is made - forgetting that during the whole of the day of 14 or 16 hours, the disease is permitted to act unopposed. Again a practitioner may very possibly employ iodide of potassium in the case of a gummatous deposit, & ultimately doubt the efficacy of the treatment, because repeated small doses of the remedy effect little change in the morbid state. In such a case a steady increase in the dose readily causes a disappearance of the trouble. One may easily imagine that an analogous error in the use of gas works emanations may explain the unsatisfactory results obtained from a half-hearted employment of the treatment. Mons. H. Roger presented a report to the French Academy of Medicine "on the efficacy of the emanations from gas works" which appeared in the
"Progres Medical". The conclusion he came to was that the treatment was unavailing. At the same time we ought not to disregard the apparently good results obtained by Lochner & Commenge. Further I fail to see upon what ground the remedy can be regarded as hazardous. Having indicated some of the chief methods of treatment, I have reached the point of giving a history of the one which has been most useful to me in dealing with the disease. Later I will add a list of cases so treated.

In the British Medical Journal Vol ii p.232.1888 is an account of an epidemic of whooping cough under the management of Dr. T. Guerder - a French Physician, and treated by nasal insufflations of boric acid & dried coffee in equal parts. It is stated that the epidemic was a severe one, & that infants were especially attacked. The treatment at first adopted was fumigation of the Patients' rooms with carbolic acid, together with internal administration of belladonna, carbolic acid & bromide of potassium, with syrup of poppies. The effect of this treatment was that the fits of coughing became less frequent, and that the reflex excitability was favorably modified. It was noted however that when the treatment was suspended, the cough assumed its original violence - & on account of the extreme susceptibility of many of the children to belladonna poisoning, it was frequently necessary to discontinue the syrup. The presence of nasal catarrh, it was stated, together with congestion.
of the pituitary mucous membrane, and the probable parasitic nature of the complaint, suggested to Dr. Guerder the advisability of local treatment, similar to that which had been successful in hay-fever. The probability that fits of whooping cough might be attributed to nasal reflex action, was supplemented by clinical data of other cases in which nasal reflex action determined fits of coughing or attacks of asthma. As I have previously stated, the dust employed, consisted of equal parts of boric acid & dried coffee. The insufflation was performed night & morning by a physician. It is stated that 30 children were treated in this way, of whom 7 were scarcely a year old, 7 were from 1 to 2 years old, 6 from 2 to 3, & 10 from 3 to 8. Among these 30 children 13 had been treated for a week or a fortnight with the syrup already mentioned, a very decided improvement being noticed - only however of short duration. The remaining 17 were exclusively treated with nasal insufflations, taking no other medicine excepting one or two emetics during the catarrhal period. Out of the 13 children treated with the syrup during a fortnight, 3 had attacks of intercurrent pneumonia, two children of 7 & 11 months succumbing, & one of 3 years old recovering. From the day when nasal insufflations were employed, no further complications ensued, nor did any more deaths occur. The treatment was commenced with a boy aged 4 years, who could not take belladonna, and who had fits
of coughing every hour day & night. It is stated, that at the end of 48 hours and after 4 insufflations, the fits of coughing only occurred 4 times during the night & 5 or 6 times in the day. When the treatment had been continued for a week, only 1 or 2 slight attacks of coughing came on during the 24 hours. With all the other children the results were the same, when the insufflations had been well performed. In a short space of time, varying from 2 days to a week, the fits of coughing generally diminished from 20 to 15 or even less, in 24 hours, & they grew less violent. Vomiting and epistaxis also became less frequent. These results it is said were simultaneous with the diminution of the coryza. In half the number of cases it was observed that after an improvement was obtained, further progress was slowly effected, the cough not thoroughly subsiding until a fortnight had elapsed. In some cases, nasal insufflation was performed at the onset of the complaint, during the catarrhal period. In these cases the attack was apparently slight, and there was complete recovery in about a week or fortnight, & sometimes sooner. In 3 cases especially there was positively an abortive influence & the cough was not periodic. The account here states the possibility of these cases having been in the nature of simple catarrh. At the same time adding that the children were in daily contact with others suffering from whooping cough. Eighteen children had
been treated with insufflations of boric acid & powdered coffee, when an article appeared by M. Grasset giving an account of an analagous treatment in whooping cough adopted by Herr Michael of Hamburg, who after trying insufflations with various powders, preferred pulverized benzoin; & it is said that his results were as good as those of Dr. Guerder, who subsequently tested the value of this remedy. He came to the conclusion that benzoin was as efficacious as the boric acid & coffee mixture, but that recovery was slower. From the time of the publication of this mode of treatment in 1886, little appears to have been thought of it, at any rate in England, for some time. However in the British Medical Journal for 1887 - Vol. ii. p.827 appeared an article by Mr. G. Holloway in which special attention is directed to the treatment described by Dr. Guerder; & further wherein a series of 24 cases of whooping cough are recorded, which were treated in this way, except that instead of a mixture of boric acid & coffee, simple undiluted boric acid was employed. Moreover the article was accompanied by a wood-cut illustrating an insufflator devised by Mr. Holloway, simple in design & not liable to become blocked or get out of order (I append a sketch of the instrument). It also has the additional advantage of cheapness to recommend it. The main points dwelt upon in the notes of the cases may be thus briefly stated :-
(1) The treatment is equally safe both for the youngest infants & for adults.

(2) A cure may be looked for in about 21 days.

The accuracy of these conclusions I am able fully to confirm, & I shall now proceed to state my experience of the treatment as carried out with pure boric acid powder & with Holloway's insufflator. My first experience of the treatment occurred in November 1887 - when 5 cases were so treated. These were succeeded by 11 cases in February, March & April 1888. In 1889 I have no record of cases, which is accounted for by the diminished prevalence of the disease, from which in that year only 5 deaths resulted in the town in which I practise. At the end of 1889 the disease again became epidemic & produced in the first 7 months of the year 1890 - 21 deaths. I find that up to July of that year I employed the treatment in 43 cases. This gives a total of 64 cases so treated. The method consisted in insufflating into each nostril one or 1½ grains of powdered boracic acid - the nozzle of the insufflator being run along the floor of the anterior naves for somewhat more than ½ an inch before the dust is insufflated. The process was repeated 3 times daily & once during the night if the child was wakeful & restless as the result of the cough. Out of the 64 cases, 42 were treated by boric acid insufflation.
only - no other remedies being employed that could be supposed to exert a specific action. Bronchial trouble was sometimes remedied by ipecacuanha, & compound tincture of bark with very small doses of mineral acid was used in some cases to improve tone & increase appetite. In the remaining 22 cases, the chief remedies employed in addition to insufflation, were bromide of potassium & belladonna, both of which have often disappointed me in other cases. The average age of the children treated has been about 2 years - the eldest being 9 years of age & the youngest 9 months, children under one year of age have formed a small minority of the total - about 10% - but they were in every way treated the same as the rest. The table which is appended gives the ages of the children. One thing has seemed clear to me in dealing with the disease - viz: - that the efficacy of the treatment is greater according as it is employed early in the attack. I have certainly obtained a striking result in those children whose attack has been characterized by initial fever - or where, being in attendance upon a case, a fresh case has arisen in the same house - circumstances it will be observed which attracted attention to the disease in its early stage. With regard to the duration of the disease when treated in this way, I find that the large majority of cases were well in 3 weeks. A few required treatment for a month, and in one case the child did not lose the cough for nearly 5 weeks.
In only 1 case did I find the treatment unsuccessful, and here a child of 2 years of age was coughing almost as badly at the end of 7 weeks as at the commencement. Apart from the fact that the disease had become well established before the treatment was commenced, I know of no reason which satisfactorily accounts for the failure. The sister of this patient, 2 years her senior was attacked with the malady while I was in attendance on the case, & recovered rapidly under treatment. Probably in the first case, in consequence of treatment being delayed the focus of irritation had spread beyond the reach of the insufflalor. Although the cough persisted in spite of treatment, no comp1ication was met with - the most noticeable feature being the copious amount of glairy mucous expectorated.

Complications have only been met with in a few cases, & it is in this direction that I apprehend the greatest value of the treatment to lie. Even in those cases where the disease operated for an undue length of time & was not destroyed, complications were absent, and we must not forget that whooping cough does not directly kill, but induces complications which often prove fatal, and to which I have already referred. One child aged 2 years had bronchitis in the course of treatment. She was a delicate child in process of den-
titation & suffered from rickets. In spite of these un-
toward conditions she was rid of the cough & bronchitis
in the space of a few weeks. In the case of another child aged 3 years, there were somewhat severe convulsions & symptoms of cerebral congestion. The only additions in this case to the insufflations, were bromide of potassium and sinapismé. A considerable proportion of the children had bronchitis in varying degrees, but in scarcely in any case was anything required beyond the exhibition for a few days of small doses of ipecacuanha. Three cases proved fatal and of these a few particulars must be given. The first occurred in the Spring of 1888. The child was 18 months old & cutting teeth. When I first saw her, the disease had reached a very aggravated degree & was accompanied by bad bronchitis. Death occurred from pneumonia 9 days after treatment was commenced, the cough remaining unmodified up to the time of death. The second death occurred in the Spring of 1890 and was due to pneumonia. The patient was a robust boy aged 2 years. I was surprised at the result until I discovered that the mother had omitted performing insufflation, because the child resisted so obstinately. The third death was that of a very delicate little girl aged 18 months, suffering from dentition & inanition- I did not see this case until it had been treated by another practitioner for some weeks. It then had pneumonia & gradually sank, the nasal insufflations being apparently without effect. Where
facilities exist for changing the children's living room frequently & sweetening the air of the vacated room by fumigation with sulphurous fumes, I believe the recovery is somewhat hastened. Further I am in the habit of allowing children to go as much out of doors as possible so long as the body temperature remains normal, & the weather is not particularly inclement. It must be borne in mind that the performance of the insufflation has been left to the mothers of the children in almost all cases. I cannot give an opinion whether similar treatment carried out by the medical practitioner would lead to an earlier disappearance of the disease.

I am desirous that the light in which I regard this mode of treatment should be clear, & unambiguous - I do not suggest that boric acid is absolutely a specific, since there can be little doubt that it only acts by reason of its antiseptic action, & many other remedies of the antiseptic group may perhaps act as well. It is rather the non-irritating and bland properties of the substance that make it so valuable, especially in the case of a disease arising as a rule among children. The character of boric acid moreover makes it applicable in the solid state. Thus the structures with which it comes in contact are so much more surely modified than by gaseous inhalations & fluid sprays. Still however I feel that the results obtained at present from boric acid are not sufficiently constant as to obtain for the remedy a
claim to specificity. I go no farther than to say that so far as my experience at present goes, it is the only remedy upon which I am able to rely with any confidence. The statistics which I have furnished indicate sufficiently the degree of the validity of its claim as a reliable agent in dealing with whooping cough.
ANALYSIS of 64 cases of WHOOPING COUGH TREATED by NASAL INSUFFLATION OF BORIC ACID.

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<tr>
<th>Age</th>
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Complications.

Complications occurred in

T. aged 2 years - Rickets, Bronchitis, Dentition.
H. 3 Convulsions & symptoms of cerebral congestion.

X) died - see below.

Duration.

Treatment cured in most cases in 3 weeks - occasionally in 2 weeks.

Delayed Cure. M. recovered at end of 4½ weeks - no complication.

Unsuccessful. M. aged 2 years - Still had the disease at end of 7 weeks - Disease well established before treatment commenced.

Deaths.

Three. 1 aged 1½ years. Dentition & Pneumonia.
1 2 Dentition & Pneumonia. The mother neglected the treatment, because the child resisted.
1 1½ years Pneumonia & marasmas. This case had been treated by another practitioner for 4 or 5 weeks before it came under treatment.