Such are some of the developments of the germ theory, and such are the rich fields it opens up before us. The privilege is accorded to us to go in and possess them. The great Alexander wept because there were no worlds left for him to conquer. We need not pause and weep, or share his regret. Boundless regions of unknown wealth lie before us, rich in blessings for mankind. But we must be prepared to conquer them. It behoves us to rise and gird on our sword—the weapon of honest industry, kept bright by daily use, untarnished by idleness, unblunted by prejudice.

ART. XVI.—*Whooping-cough: its Pathology and Treatment.*^a By
THOMAS M. DOLAN, F.R.C.S., Edin. ; L.R.C.P.E.

WHAT is whooping-cough? A definition may be easily framed. It is a communicable disease depending on a specific poison. It prevails epidemically and sporadically. It is characterised by fever, malaise, irritation of the respiratory tract, catarrh, and subsequently by a hard, dry, convulsive, paroxysmal cough. It attacks all ages and sexes, but especially children, rarely occurring more than once; usually it runs a course varying from three weeks to three months. It may be complicated with other lesions, as ulceration of the frænum linguæ, enlargement of the tracheo-bronchial glands, capillary bronchitis, lobular collapse, emphysema, various hæmorrhages, convulsions, catarrhal pneumonia, tubercular meningitis, and other diseases of children.

This definition is sufficiently broad and comprehensive for all practical purposes. It, however, is not sufficient. A recapitulation of symptoms is not an explanation. Without sheltering behind a definition I shall attempt to explain more explicitly the nature of whooping-cough. A survey of our literature reveals to us the great divergence of opinion that has existed, and still exists, on its pathology. The favourite view seems to be to look for its seat in the nervous system, so we have theories fixing on the cerebrum, medulla oblongata, pulmonic and diaphragmatic nerves, pneumogastric, and phrenic nerves, as the centres of morbid change; we have theories in which it is assigned to a catarrh of the lungs and stomach, to a form of specific inflammation of the larynx and glottis. It has been looked upon as a form of bronchitis, inducing

^a This paper is a *résumé* of the Fothergillian Prize Essay for 1882. Read before the Medical Society of London, Oct. 16th, 1882.

directly spasm of some part of the respiratory apparatus, or cephalic irritation, which in its turn excites the spasm. It has been ascribed to the irritation of insects. These are the views of the earlier writers on the disease.

Modern views are mainly composed of a repetition of the above.

Time will not allow me to dwell upon all the theories advanced, but I shall devote a little attention to the views of Dr. Guéneau de Mussy, in order to make them the basis for my objections against the majority of theories.

At a meeting of the Academy of Medicine, Paris, 1876, M. Guéneau de Mussy presented some pathological specimens, collected by an old pupil, M. Parinaud, who, in two *post mortem* examinations which he had made on children dying from whooping-cough, had found an enlargement of the tracheo-bronchial glands compressing the pneumogastric and its bronchial branches. The theory of M. Guéneau de Mussy is, that the malady is essentially an affection of these glands, a bronchial adenopathy. In 1846 Dr. Ley advanced a somewhat similar view. In the *British Medical Journal*, October 25, 1879, Dr. de Mussy has another contribution more explanatory of his views. I share in the objections raised by M. N. Colin, Hardy, Blot, Woillez, in the discussion at the Academy of Medicine, Paris; and by Drs. Barlow and Burney Yeo, at the Pathological Society of London, January 31, 1879.

My own experience and the *post mortem* evidence obtained by me are confirmatory of the observations of Drs. Barlow and Yeo. Still more the evidence of the *post mortem* room is conclusive on another point. Though the bronchial glands may be enlarged from various causes, yet the pertussoid cough has been absent in life. Amongst the poorer classes, amongst those whom we have an opportunity of examining in our public institutions, glandular enlargements are but too frequently seen; the cervical, mesenteric, and inguinal glands, may be palpably felt enlarged. This arises from the unhealthy conditions, insanitary surroundings, and bad or impoverished diet of this class. As the superficial glands are thus enlarged we may not unreasonably infer that the deeper glands will be affected. The *post mortem* room is the place to verify this, and I have found that this inference is generally correct. Pertussis has been absent during life in these diseases. Many of the arguments against the de Mussy theory apply to all theories which would locate the disease primarily in a nerve centre. If we admit

a pure nervous theory, then we must dismiss a theory of contagium vivum.

Against the theories which place pertussis amongst the bronchitic class, independent of the difference of symptoms, the contagious argument has equal force. I cannot find any evidence to support the view that it is primarily an inflammation of the larynx and glottis. The theory of its relation to the exanthems will admit of fuller consideration. There is singular unanimity amongst medical writers on some of the facts about pertussis. All agree in considering it contagious or infectious. It has its period of incubation, of effervescence and defervescence; it has a character peculiar to itself. It runs a regular course; it rarely occurs more than once in the same individual. Though its virulence does not equal that of scarlatina or variola, yet it is sufficiently active to extend the disease, and the contagium may be carried to a distance. Walsh relates a case furnished him by Dr. Neil Arnott. In 1877, whilst carrying on some experiments with the sputa, I carried infection to my own house. One of my children contracted the disease.

Looking at all the phenomena and the symptoms in their entirety, whooping-cough presents certain resemblances to the so-called zymotic diseases. The very absence of distinct morbid, primary, anatomical changes, favours this view. On the grounds of analogy I would extend the list of diseases caused by minute organisms, by including whooping-cough in the group.

It is an axiom in logic and philosophy that when several explanations are offered to account for any phenomenon, it is always better to choose the simplest. In classing whooping-cough among the fungoid diseases I am acting on this sound principle.

1st. It is simple.

2nd. It is in harmony with some ascertained facts.

3rd. It explains most of the phenomena.

4th. It has been partly verified.

Previous experiments have been made in this direction.

Linnæus, to a certain extent, foreshadowed modern views when he endeavoured to prove that almost all diseases were produced by animalculæ, or had an insect origin; though his opinion was only adopted by the Linnæan school.

Many of the older writers believed that what was termed tussis sicca, or dry cough, was produced by the larvæ of insects, the minute eggs being exhaled into the air of respiration, finding a convenient nidus in the bronchial vessels.

Linnæus and the older writers were not so very far wrong. It was reserved for the present generation to prove that germs were at the root of many diseases, and that from these germs organisms were developed which grew, reproduced, and died—which thus manifested all the signs of vitality, so that they had to be classed as organic.

The insect of Linnæus is the microbe of Pasteur. Two great minds thus meet at the same conclusion.

Letzerich states he has succeeded in producing whooping-cough in rabbits, by inoculating the trachea with the sputa of the human subject. These sputa, he maintains, always contain fungi. So far back as 1867, M. 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 was dependent 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 fungi while circulating in the blood.

I have not been able to find any references to any English observer who believed in a fungoid origin. Since Poulet first propounded the fact that he had found some form of infusoria in the sputa of whooping-cough, we have made great strides in our knowledge of the organisms which he misnamed.

Poulet, Letzerich, and Binz stand almost alone in their views and experiments.

I have endeavoured to find out the organism on which pertussis depends, and a series of experiments were made in order to test the contagious influence of the blood, nasal secretion, expectoration, saliva, vomit, and other fluids thrown off from the body. The animals I selected for experimentation were rabbits. The poet is born, not made; and so I believe the experimenter has to have special gifts. It is not given to all to be a Pasteur, Koch, or Lister. Valueless though my experiments may be, yet they indicate the lines on which we must search for the intimate nature of pertussis.

As regards the blood in pertussis I could find no alteration in colour, constituents, proportion of red and white corpuscles; I could not detect any organism; injected into rabbits, no effect was produced.

As regards the nasal secretion and sputa a decided effect was produced; when injected into nasal passages, roof of mouth, and back of some rabbits, the rabbits died.

One point of interest connected with these experiments is that the sputum exerted its poisonous influence, whereas the blood did not do so.

The question naturally arises — Is there a morbid principle attached to the sputum intrinsically belonging to it? or, is the morbid principle the result of some kind of alteration in the sputum subsequent to its ejection from the bronchial tubes of the pertussoid patient, from whom it was obtained? These suggestions or enumerations of particular questions springing from the general question of the pathology of whooping-cough, show us what a highly complex problem we have to solve; and this complexity is not confined to whooping-cough, but is *inherent* to all questions on the nature of infectious and contagious diseases.

I believe that the nasal secretion and sputa thrown off by a patient with whooping-cough contain a well-characterised toxic principle, which we may consider as the principal agent of the malady; that the sputa, &c., confine this morbid principle, though as the result of change, germs may be thrown off into the air, thus spreading the infection, and acting as a ferment, just as the common germs of milk fermentation or putrefactive change act. When the sputa, nasal secretion, or blood of a patient suffering from whooping-cough are allowed to stand for about eight or ten hours, we can readily find ordinary forms of bacteria, but these forms will not give rise to pertussis.

It is probable that M. Poulet mistook a harmless bacterium for a harmless bacillus, as there is little or no difference in the appearance or behaviour of some forms of these respective organisms under the microscope, though there is a very important difference in their action, by means of which we are able to differentiate between them.

I have frequently seen in the sputa of whooping-cough the appearance of an organism, to my eye resembling the spirochæte plicatilis of Cohn; but on submitting sputa of this nature to a better microscopist than myself, I have been assured that this seeming microbe was a delusion. I make this confession as it is so easy to make mistakes in microscopic work, and it is possible to see in the field of the microscope what we wish to see. There is a personal equation which must be allowed for. Though I believe that some form of microzyme, or microbe, is the cause of pertussis, yet I cannot truly say it has yet been found.

Since this essay was written, the tubercle bacillus has been

discovered by Koch. Improved methods of staining have been devised by Dr. Heneage Gibbes and others, by means of which these minute organisms may be more readily seen.

Further experiments with the sputa of pertussis will, I believe, reveal the existence of a special microbe.

All admit that pertussis is contagious. How does the virus find an entrance into the system? How does it act when introduced? As a germ disease it follows the laws of other germ diseases. The germs enter by some of the channels by which other contagia enter. They develop in the blood, setting up constitutional disturbance, subsequently attacking the pulmonary epithelium, and giving rise to all the phenomena which characterise whooping-cough.

We have location of bacilli in splenic fever, wool-sorters' disease, and phthisis. From the lungs spores or germs are again thrown off into the air; the contagion is thus carried about and extended.

Do we find any morbid lesion peculiar to whooping-cough? There is one almost constant lesion—viz., ulceration of the frænum linguæ. This is traumatic; the indispensable conditions for its occurrence being propulsion of the tongue outside the mouth during a violent attack, and repeated rubbing of the frænum on the free borders of the incisors.

In pure uncomplicated whooping-cough the scalpel of the most practiced anatomist fails to detect any characteristic or pathognomonic lesion. If my hypothesis be true, I am not surprised that morbid anatomy should not throw any light upon its pathogenesis, when the patient dies in the primary stage of the disease.

If we make a *post mortem* examination on the body of a person who has died from wool-sorters' disease, the scalpel of the anatomist will not reveal the nature of the disease—presuming at the same time that the symptoms during life are unknown to him.

The same may be said of typhoid, before complications have arisen.

The simple disease, whooping-cough, is rarely fatal; it is the complications which kill and leave their marks behind.

Whooping-cough cannot long persist without leaving some impression upon various parts of the frame, and we have consequently secondary lesions, which I have considered in full in my Essay, but time will not allow me here to dwell upon them.

I must, however, devote a little time and consideration to the phenomena of "Kink" or Cough.

In no other disease do we meet with such a cough. It has a

character peculiar to itself; it is known to every mother, and the diagnosis is soon made out when once you hear this "kink." It is unlike the cough of laryngismus stridulus. How is it caused? Coughing is a common effort, consisting in the first place of a deep and long-drawn inspiration, by means of which the lungs are well filled with air, this being followed by a complete closure of the glottis, followed again by a sudden and forcible expiration, in the midst of which the glottis suddenly opens, and a blast of air is driven through the upper respiratory passages. Coughing is a reflex act. But there is something more in the cough of pertussis. In what does the difference consist, and what are the pathological conditions, if any? There are two stages in the paroxysms.

First. We have a number of expiratory efforts made in quick succession, during which the air is driven out of the lung in jerks of varying degrees of violence. During this stage no air is taken in to make up for what is lost. The blood is thus imperfectly aerated, and the patient seems on the point of being suffocated.

In the second stage we have exhaustion of the paroxysm, followed by a long-drawn act of inspiration; at this period the peculiar crow, kink, or whoop, so characteristic of the disease, is heard. The violent expiratory efforts, followed in turn by inspiratory efforts, recur again and again under the influence of reflex irritation. The paroxysms may go on until the irritation is removed, expectoration or vomiting accomplishing this.

The question naturally arises—In what condition are the lungs during the paroxysms? If the chest be auscultated between the short intervals of expiration and inspiration, you will hear some wheezing or vesicular breathing; but if the ear be applied to the chest during the long-drawn noisy inspiration, there is nothing to be heard. How can we account for this? Several hypotheses have been put forward:—

1st. It has been supposed to result from the slow and niggardly manner in which the air passes towards the lungs through the chink of the glottis, which is spasmodically narrowed.

2nd. Laennec believed that it depended in part upon a spasmodic condition of the muscular or contractile fibres of the bronchi and their branches. We have no *post mortem* evidence to confirm Laennec's view, but if it were possible to examine the lungs in this stage I am of opinion that Laennec's view would be found correct. We know now more about the minute anatomy of the lungs than we did in the time of Laennec. The industry of Charcot has

opened out to us the minute anatomy of the lung. We must bear in mind the minute anatomy of the lungs if we desire to fully appreciate why all is silent in the chest during the inspiratory stage, the causes at work in the production of emphysema, collapse of the lung, and other secondary conditions of the pathology of whooping-cough.

The minute anatomy is very important in connexion with the part played by the pneumogastric nerve in whooping-cough. Roughly stated, the lungs are supplied from the anterior and posterior pulmonary plexuses, formed chiefly by branches from the sympathetic and pneumogastric. The filaments from these plexuses accompany the bronchial tubes, upon which they are lost. Small ganglia are found upon these nerves. Irritation of these nerves is said to have the effect of producing contraction of the bronchial canals, sufficient to expel a certain quantity of air. If this theory be true, it helps us in explaining why the larger, mediate, and smaller bronchi are closed during the expiratory stage of the pertussoid paroxysmal cough.

Professor Albers, of Bonn, states that after having examined the bodies of forty-seven children who died of whooping-cough, he found the vagi perfectly healthy in forty-three. I allude to this as there is a theory that inflammation of the vagus is the primary cause of pertussis.

I cannot dwell upon all the complications, but I must allude to two:—

1st. Emphysema.

2nd. Pulmonary collapse.

Emphysema will be found frequently in *post mortem* examinations. The explanation of this condition given by Sir William Jenner is the one I accept—viz., that it is attendant on expiration. Lobular collapse of the lung is so frequently met with in whooping-cough that, according to Alderson and Hewitt, it is rarely absent. I have nothing to add to the able account given by Sir John Alderson.

En passant I may allude to a statement of Gibb, that the urine is very frequently saccharine in pertussis.

I have examined the urine of fifty children with confirmed whooping-cough, and could only find traces of sugar in fourteen. The presence of sugar in the urine of children may be accounted for without ascribing it to the irritation of any nerve.

In concluding this first portion of my Essay I must mention that

I do not make any claim to be the first who has propounded this theory. In the history of medicine it will be found that there are few theories advanced, even in modern times, which do not bear some relation to some theory advanced at some previous time, or, as George Meredith says:—"The moderns live on the ancients, and not one in ten thousand can refer to the particular treasury he filches."

I consider this theory to be the most satisfactory yet propounded from a pathological standpoint, whilst at the same time it harmonises with the majority of the methods of treatment advanced, and renders them intelligible. Treatment is even more valuable than hypotheses about pathogenesis; and treatment may be correct even though our pathological views may be wrong.

In all the various methods of treatment advocated—running, as it were, like the diapason or the swell of the organ, through all the supernumerary notes which complete the *mótif*—there has been one great leading idea—viz., that whooping-cough should be guided through its course, warding off inflammation, and quieting irritation. This is the key-note which has been struck by some of the best physicians, past and present. Under the zymotic theory this key-note is alone explicable.

I shall presently consider the subject of treatment; but first I must devote some time to the question of prevention.

There has been no systematic attempt made to educate the public on the preventive measures which should be adopted to limit, check, or stamp out whooping-cough. There are few diseases about which there is more lamentable ignorance and carelessness amongst the public, and the people sin in consequence of this. Though it is popularly believed to be contagious, yet no precautions are taken to prevent infection.

There is one great fallacy against which for many years I have contended, though I regret to say without much result. The public believe that every child must have whooping-cough, measles, and scarlatina, and as they must have these diseases, the sooner they contract them the better. When I have asked sensible fathers and mothers why children should have such diseases, they have fallen back upon their experience, and told me that it was one of the laws of Providence, and that there was no escape from it.

Whole hecatombs of children have been sacrificed at the Moloch of custom and superstition. We have a great work to do in the present and in the future; we must kill this false

idea, and teach the people to value at their proper worth pure air, pure water, cleanliness, and light. The most numerous class is called the working class; we must begin our work on this stratum.

How necessary instruction is, all medical men must know. When scarlatina or measles invades some of the households of our working classes, there is no attempt made at isolation. Sympathising neighbours come backwards and forwards, other children are exposed to the contagium, and thus the disease is carried from one house to another, and perpetuated.

When a child has the whooping-cough it is allowed to play with other children, sleep in the same bed with them; there is not even a pretence at isolation. Children play in the streets, travel by cabs, omnibuses, railways, with confirmed whooping-cough, and no notice is taken of it, and no wonder expressed that such a thing should be. We often hear it said—"The child has only got the whooping-cough." Yes; the child has only got a disease which causes a fourth of the annual mortality amongst children under five years of age in London—only got a disease from which thousands of children die annually in the provinces, and yet we wonder that we have a high infant mortality. Contagium is what we have to contend with in whooping-cough. If it were possible on the same day to isolate all the children suffering from this disease in England, and to keep them in quarantine for a lengthened period, whooping-cough might be stamped out. This is, I know, impracticable. We may, however, do much to check and limit it. Without the assistance of the public we are powerless.

Whooping-cough, like all the other zymotic diseases, teaches us one lesson—the dependence of one class upon another. If we throw a stone into a pond a very well-known phenomenon occurs. The water is disturbed, very soon circles may be seen radiating from the disturbed centre; these circles increase, grow wider and wider, until they are ultimately lost to the perception of the eye; each circle bears a geometrical relation to the preceding circle—all owing their origin to the primary point at which the stone sank out of sight. When whooping-cough or any other infectious disease occurs, from this tainted centre waves or circles may be thrown off; these waves may increase, growing wider and wider, but, different from the mimic circle on the pond, carrying with them disease, misery, and death. These waves do not respect old or young, rich or poor, the prince or the peasant—they all bear a

relation to the primary case, so that each class has an interest in confining the operation of the primary disturbance.

If each one discharged his individual responsibility there would be no excessive individual sacrifice; if each one considered his neighbour, how easy it would be to check infectious disease—it all follows in a consecutive chain of duty and self-interest. By the isolation of the first case of whooping-cough in any house or street, by the observance of the general directions I have given, a limit would be put to the spread of the disease. One family would suffer a little self-denial, and it would involve a little self-sacrifice, but the general gain to the community would be great indeed. I have entered into full details in my Essay as to the necessary measures to be adopted.

Curative and Palliative Measures.—The scientific physician does not pretend to cure scarlatina, measles, typhoid fever, small-pox; but, like the helmsman at the helm of a ship, he strives to guide their course, to pilot his patients safe to land, to recovery, avoiding the reefs and rocks, or otherwise the complications, which may arise. Great skill is required in this process, even though all the above diseases run naturally towards recovery. Like the above diseases, whooping-cough as a rule runs a regular course, and the efforts of the physician are directed to steering safely through the perils which surround it. His aid is valuable, even though he does not pretend, in the sense in which it is generally understood, to cure it. Many specifics have been introduced, claiming the power of arresting the disease; most of them have proved worthless.

It would not be far from truth to say that nearly all the drugs in the Pharmacopœa have been tried:—Arsenic, alum, acetic acid, antimony, benzine, belladonna, bryony, chloral, cannabis-indica, cantharides, cochineal, croton oil, chloroform, carbolic acid, drosera, ether, hydrocyanic acid, hyoscyamus, ipecacuanha, iodide of silver, lobelia, laudanum, morphia, nux-vomica, nitric acid, petroleum, potassium salts, turpentine, salicylic acid, and quinine, have been recommended and praised for their efficacy by various writers. Blistering and bleeding have had their advocates.

Looking at this long list, the student naturally must have a difficulty not only in selecting a medicine, but even in comprehending on what principle so many drugs have been used.

In olden times when a gun called a blunderbuss was used, a large quantity of shot was placed in it; when it was discharged there

was a great waste of lead, but the sportsman had the hope that some of the pellets would hit the object aimed at. We might understand the *rationale* of using the above-named medicines if they were all compounded in the same mixture—the prescriber might have a hope that some of them would reach the disease, and thus do some good. Administered singly it is not easy to understand on what theory they could be prescribed.

I shall devote a short space to the consideration of some of the methods and treatment of the theories advanced. I shall commence with the views of that great observer, Cullen. How terse is his definition of simple whooping-cough:—"Morbus contagiosus; tussis convulsiva, strangulans, cum inspiratione sonorâ iterata; sæpe vomitis." There is a text for half-a-dozen pages of descriptive word-painting.

Sir Thomas Watson has left us an admirable piece of word-painting, in his "Practice of Medicine," of a paroxysm of whooping-cough; but his diction is soft and graceful, while Cullen's is forcible, vigorous, and rough. Both were masters in their art. We have reason to be proud that we have our literature enriched by such writings.

Cullen observes with singular modesty:—"I dare not say anything towards a theory on its pathology. I have no conception of what are the circumstances of the peculiar contagium which determines it to the lungs." As I read these lines, the words come instinctively to my mind (perhaps applicable to myself):—

"Fools rush in where angels fear to tread."

Though he has not a theory, yet he throws out hints on the treatment—suggestions sound and rational.

1st. He recognised that whooping-cough, like measles and scarlatina, runs a certain defined course.

2nd. That there is a particular determination of the disease to the lung, just as in measles we have a determination of the poison to the skin and bronchial mucous membrane.

3rd. He believed in contagium.

4th. He divided his treatment into two stages:—(a) when the contagium is active; (b) when it has expended itself.

Here again we have an analogy with measles and scarlatina; they have their periods when the contagia are active, and when their respective poisons exhaust themselves. These views of Cullen lend a support to my hypothesis. His method of treatment, as regards divisions into two stages, is a very rational one. After the

time of Cullen a number of theories and plans of treatment were put forward.

It is pleasant to turn from these theories to the views of a writer whom I have mentioned in the same line as Cullen. I allude to Sir Thomas Watson. He has not any specific to offer, but he has some sound advice to give. He tells us that the object of rational treatment in whooping-cough, supposing the disease to be simple, should be to keep it simple, to keep it mere whooping-cough, to obviate serious inflammation or mischief in the chest or head, and, if possible, to mitigate the severity and shorten the duration of the fits of coughing.

He does not believe that the duration of the complaint could be abridged. "It will," he says, "in all probability run a certain course, and our business is to conduct it evenly and safely to the end of its course; you will find different persons employing and praising different plans of treatment, the object in all cases, however, being the same—viz., to ward off inflammation and to quiet irritation." I think there can be no question as to the soundness of this advice, and that Sir Thomas Watson has struck the key-note of what treatment should be in the last few sentences I have just quoted. There is one popular remedy on which I shall say a few words. Children are taken to gas works. This is an old remedy.

I have tested the remedy and examined statistics which have been published on the subject, and my conclusions are:—

1st. That in the majority of cases no amelioration in the symptoms or in the duration of the malady has resulted from it.

2nd. That in the minority of cases some benefit has been derived from it. It has not cut short the paroxysms, so that its specific value must be considered as non-existent.

There is a method of treatment, but it is based upon experience and observation. Certain medicines are useful, as hydrocyanic acid, belladonna, bromide of potassium, atropine, carbolic inhalations. The physician will have to be guided by circumstances as to when he shall use depressants—as ipecacuanha.

The method I have adopted for years has afforded me good results, looked at from the numerical standpoint I have just mentioned. It does not pretend to be treatment of a specific nature. I have endeavoured to guide the disease scientifically to a successful issue.

In all plans of treatment certain modifications must be made, depending on the occurrence of exceptional phenomena. Every

plan of treatment must be modified to suit the age, constitution, and the environment of the patient; thus, for instance, we could not pretend to treat a delicate strumous infant with whooping-cough in the same way as we would treat a robust, strong and healthy infant; nor would we use the same measures for an infant that we would employ for a child of two or four years of age.

An empiric might make a fortune by announcing that he had a cure for pertussis even at the present day, and if he were to make up a mixture of bromide of potassium or ammonia, and advertise it with the same spirit of enterprise with which Holloway and Eno have pushed their pills and fruit salt, the same rich reward would almost certainly follow.

Treating the subject from a scientific standpoint, and apart from empiricism, I am forced to agree with those older physicians who have taught that there is no specific for whooping-cough, and that we must be content with guiding the disease through its course. How we may do so I have endeavoured to show, and still more, as prevention is better than cure, laid down directions on prophylaxis which, if adopted, would deprive us of the necessity of having to attempt to cure it.

The latest development of the genius of Pasteur has found issue in arresting splenic fever and fowl cholera by inoculation with the attenuated virus of the microbes upon which those diseases depend, so that I may not unreasonably hope that as whooping-cough is a bacteroid disease, we may be able by his method to add a more powerful weapon to our preventive measures, and that by inoculation with the attenuated virus of pertussis we may render infants insusceptible to the contagion.

Jenner conferred a boon on humanity by the introduction of vaccination. Following in the footsteps of the illustrious Englishman, Pasteur promises to be equally a benefactor to his race. But is not this a sad confession to make that we have to depend on prophylaxis—that we have no specific. I do not think so.

We can control and direct the disease just as we can control scarlatina and variola. We have no specifics for them.

My views are, I believe, in perfect harmony with the temper of medicine in modern times. It is not derogatory to true progress to recognise the Hippocratic *vis medicatrix naturæ*. It is something to be able to estimate the physiological disturbances going on in virus diseases—the heat, the waste, increase of heart or lung action, the altered functions of secretion and excretion; to have the power

of directing or controlling physiological action, though we may not arrest or neutralise the specific organisms at work. It is something to know the nature of the organisms we have to deal with; it is something to feel proud that, by the aid of sanitary science, we can prevent such diseases, though they depend on entities which cannot be cast out after the incubatory stage.

The true pathogenesis of pertussis may not have been pointed out by me, yet if my views be adopted they afford a wide sphere for activity. We can relieve certain symptoms as they arise; we can alleviate, we can palliate, and we can prevent. To counteract the causes of disease is the highest triumph of our art. There is a true and a false medicine—the true consists in knowing how much we know; the false, in pretending that all the arcana of disease and nature are open to us. The true is noble and honest, the false is ignoble and dishonest.

In the interests of the true it is better to unhesitatingly declare that there is no specific for pertussis, and to show the reason why. This I have endeavoured to do. In the interests of our little patients I should have been pleased, had facts allowed me, to write that there was a panacea for pertussis; and when the specific is found I will hail its advent with joy, and gladly put it to the proof. It would be a pleasure in this case to be convinced of holding erroneous views. Meantime, waiting for the panacea, I submit my own method of treatment to the consideration of my readers, and in the words of Horace I say—

. "Si quid novisti rectius istis,
Candidus imperti; si non his utere mecum."

VENEREAL AND COMMON WARTS.

UNNA (*Monatshefte für prakt. Derm.*, 1882, Band I, No. 3, p. 96) recommends for the treatment of condylomata acuminata and ordinary warts the continuous application of unguent. hydrarg., containing five per cent. of arsenic. In the case of a young girl upon whose hands were a hundred or more warts, the unbroken application for three weeks of a plaster containing in each 0.2 square metre 10 grammes of arsenic and 5 grammes of mercury, caused entire disappearance of the disease without any irritation of the normal skin. Cure was effected not by reason of necrosis and destruction of the warts, as after the use of caustics, but by resorption, as in cases of spontaneous cure.—*Boston Medical and Surgical Journal*, Oct. 5, 1882.