feelings of the patients speedily improved. As I have already said, the number of cases here examined is too small to allow of any general deduction with regard to so variable a malady as rheumatic fever; but, while the number of cases is small, the facts are, in my opinion, so definite, and so constant in the direction to which they point, that I trust they will lead others to employ, and on a large scale, a medicine which has certainly done no harm, and has appeared to relieve very materially the pain, and shorten the duration of one of the most distressing and most tedious of acute diseases.

REMARKS ON EAR-COUGH AND ITS MODE OF PRODUCTION.*

By CORNELIUS B. FOX, M.D., M.R.C.P.

A COUGH has been defined to be "a violent and sonorous expulsion of air from the lungs, preceded, rapidly followed by, or alternating with, quick inspiration." We are all very well acquainted with the various parts concerned in the production of this "sudden, convulsive, expiratory effort," and also with the mechanism of the act. Let us look with gratitude on those who have been immortalized by the discovery of the great laws of reflex action. May the names of Prochaska and Marshall Hall stimulate us to make fresh efforts towards a more complete knowledge of that great enigma—the nervous system! The act of coughing has been said, by a great modern authority, to be due to any source of irritation affecting the posterior part of the mouth, the trachea, or bronchial tubes. We shall presently see, however, that it is a symptom of a great variety of affections; so many, in truth, that time will only permit me to name them.

Coughing, although generally an involuntary act, may be produced voluntarily; and this kind of cough is generally observed in impostors. A cough can now and then be, to some extent, suppressed by an effort of the will.

We can readily understand its object in cases of pulmonary disease, where the expulsion of secretions is requisite. In cases where it is produced by worms in the intestines, or teething, etc., its beneficent action is not so apparent, unless it be considered to give warning of, or draw attention to, an irritating cause somewhere in operation.

Cough is usually regarded as a symptom; but Drs. Young, Copland, Good, and others, have considered that it occasionally occurs as an idiopathic affection. It cannot be doubted that it is, in some rare cases, impossible, in the present state of our knowledge, to ascertain the cause of a cough, and to these cases the term *idiopathic* has, I apprehend, been applied. We are told that "*felix qui potuit rerum cognoscere causas*," and we must, if we would make any true progress in the healing art, perfect its very alphabet and provide the foundation-stones on which the superstructures of treatment and prognosis, etc., should be raised.

Let us, then, endeavour to assist in the determination of every "*fons et origo mali*," so that we may, as soon as possible, expunge the word *idiopathic* from our vocabulary. Before, however, commencing my remarks on the particular kind of cough which forms the subject of this paper, allow me to bring back to your recollection some of the many causes of this symptom.

Cough is, of course, most commonly symptomatic of diseases of the lungs and their coverings, of the trachea, bronchi, larynx, and fauces. Books tell us that it is occasioned by affections of the tonsils, uvula, pharynx, and neck. Organic diseases of the thoracic viscera; diseases of the œsophagus, spine, and spinal cord; affections of the heart, liver and stomach; all have occasionally a cough as one of their symptoms. The irritation produced by teething, by enlargement of the bronchial glands, by worms in the intestines, by tumours, aneurisms, tubercles in the lungs, will produce cough. The inhalation of the dust of ipecacuanha, and of certain animal and vegetable emanations, will sometimes induce cough. Then there are whooping cough, asthma, nervous or hysterical cough, and the cough occasioned by the presence of foreign substances, either solid, liquid, or gaseous in the air-passages. Uterine derangements, irregular gout, and an accumulation of bile in the hepatic ducts or gall-bladder, are all included amongst the causes of cough.†

Lastly, there is a cough caused by irritation of the auditory canal, and that only in some people, to which I have given the name of ear-cough. I should not have presumed to name it, were I not pretty sure

that this kind of cough had hitherto escaped description, and even recognition in our text-books. And this fact is the more singular, inasmuch as the sympathy between the auditory canal and the larynx was well known to the older writers, although apparently lost sight of by modern authors. This kind of cough has, doubtless, been confounded, up to a very recent period, with nervous cough, which occurs in persons of highly nervous temperament, and is due to a convulsive action of the throat-muscles; or else it has been included in that *terra incognita* of idiopathic coughs.

One of the problems of Cassius Medicus was the following:—"Why does irritating the ears, as, for example, with a speculum, cause sometimes a cough, just as if the trachea were irritated?" Whytt, in his work on the *Sympathy of the Nerves*, published in 1767, refers to it, and states that, when the trachea has been rendered more sensitive than usual by a catarrh, cough is more readily produced by irritation of the auditory canal. Pechlin (*Observationes Medicae*, Lib. ii, No. 45) affirms that "an irritation of the meatus auditorius will often excite coughing, and sometimes vomiting". Coming down to more recent times, we find that Kramer, in his treatise on the *Diseases of the Ear*, published in 1837, makes the following solitary observation relative to this subject: "Tickling and scratching the meatus excite in the larynx a troublesome irritation to cough". Romberg states, that "Pruritus of the external meatus auditorius, from hyperæsthesia of the auricular branch of the vagus, is sometimes observed, and is accompanied with cough and vomiting".* The only references to this sympathy, with which I am acquainted, in the principal recent works on medicine, are the following. Dr. C. J. B. Williams, in his *Principles of Medicine*, whilst enumerating the reflected and sympathetic sensations, writes: "Touching the external auditory meatus causes a tickling sensation of the epiglottis." Toynbee, in his work on *Diseases of the Ear*, says: "In certain cases the presence of a foreign body in the meatus gives rise to coughing, and even to vomiting; symptoms which seem traceable to irritation of the auricular branch of the vagus nerve." Yearsley refers in general terms to the alterations of the voice, as regards its pitch and quality, which occur in cases of deafness dependent on diseases of the ear, but does not otherwise allude to this connection.

In my graduation thesis "Concerning the Laryngoscope and some Laryngeal Diseases" (June 1864), presented to the University of Edinburgh, reference was made to the sympathy subsisting between the external ear and the larynx, and an explanation of the same was advanced. In a paper written by me in 1868, entitled "The Sympathy between the Auditory Canal and the Larynx," the occasional occurrence of ear-cough was adverted to. The advisability of a careful examination of the auditory canal was also urged in all cases where no affection of the respiratory tract can be discovered, and in which an obstinate cough, whether laryngeal in character or otherwise, obtrudes itself as a prominent symptom. Further observation in this country and on the continent has convinced me that a state of hyperæsthesia of the nerve supplying the external auditory meatus is not of unfrequent occurrence, and that a cough, solely dependent on the existence of some irritation in that canal, is by no means rare.

With the object of ascertaining the percentage of those subject to this sympathetic peculiarity, 108 persons have been examined by myself, and others under my direction, with the following results:—Males examined, 37; females examined, 45; sex not noted, 26; total, 108. Cases in which a sensation of tickling in the throat, and cough, were occasioned by a titillation of the auditory canal, 22; cases in which nausea was alone produced, 3. In one of the cases of irritation of the throat with cough, nausea was also complained of; and in another of that number, vomiting was said to be sometimes produced. It is my impression that both ears display this extreme susceptibility to impressions more frequently than one ear only. In twelve cases, the ear was noted, by the titillation of which these symptoms could be excited. Of these, in seven cases, the left ear alone, and in the remaining five, both ears exhibited this peculiarity. I have hitherto only seen one case where the right ear was solely affected with this hyperæsthetic condition.

Dr. Denton, who has kindly assisted me by the examination of many dispensary patients, was somewhat astonished to find that, in one woman whom he examined, about twenty-four years of age, vertigo was alone complained of.† In another woman, about thirty years of age, a sensation of tickling in the throat, cough, as well as nausea, were produced by him on irritating the left ear; whilst vertigo was only experienced when the right ear was experimented on. He informs me that in neither of these cases was there any hysteria or fanciful nervous condi-

* Read in the Physiological Section at the Annual Meeting of the British Medical Association at Leeds, July 1869.

† Apropos of idiopathic coughs, allow me to commend to your notice a paper on "Nervous or Convulsive Coughs," by M. Sandras, in the 36th volume of the *Bulletin de Thérapeutique*.

* See a review of his *Lehrbuch der Nervenkrankheiten des Menschen*, in *British and Foreign Medical Review*, April 1844.

† Dr. Brown-Séquard, in his *Physiology of the Nervous System*, refers briefly to the production of vertigo by an irritation of the neighbouring auditory nerve.

tion. He believes, moreover, that the statements of these women are thoroughly reliable.

The curious hyperæsthetic condition which we have been considering would seem, then, to be present in about twenty per cent. of those examined. I have not yet sufficient data on which to form an opinion as to its relative frequency in the sexes.

The response to the inquiry, as to the duration of the peculiarity, was generally to the effect that they had been aware of a feeling of irritation in the throat, usually followed by a cough, on employing the ear-pick, so long as they could remember.

It is possible that this state of hyperæsthesia may be present more frequently than the foregoing percentage indicates, because those submitted to examination were nearly all workhouse and dispensary patients. In these people, the nervous organisation is not, of course, so sensitive as in the higher and better bred classes of society, and their powers of observation are more limited. I speak of those whose attention is rarely directed to a sensation short of pain, or of that which prevents the employment of the limbs and the ability to work.

Here are some short notes of a case of this hyperæsthetic condition of the nerve supplying the auditory canal, which differs from the majority of these cases, in possessing the peculiarity on one side only.

CASE I.—A. B., a professional man, of middle age, nervous temperament, healthy, but somewhat overworked mentally, has been annoyed, so long as he can remember, with a feeling of irritation in the larynx whenever he has introduced an ear-pick for a short distance within his left auditory canal. This sensation frequently excites a violent cough, of a suffocating or convulsive character. The organs of hearing appear, on examination, to be perfectly healthy, the sense being somewhat more acute on the affected side than on the other. A careful examination of his larynx by means of the laryngoscope, has assured me of the absence of any abnormality whatever. He often finds that the excessive use of his voice, as in long continued singing, produces a pain in the ear, which extends into the zygomatic fossa and along the lower jaw towards the chin.

Irritation of the auditory canal in those who are the subjects of this hyperæsthetic peculiarity, does not always produce a cough. The situation of the irritation and its intensity have much to do in the production of this symptom. I know a medical man who is now troubled with a chronic inflammation of the dermis lining the meatus, accompanied by desquamation of the epidermis. This affection being limited to the outer part of the auditory canal, being mild in character, and free from symptoms of any severity, produces simply a sensation of tickling in the throat.

I will now give you brief abstracts of two or three cases of ear-cough which have come under my notice, premising that the recital of full details would be irksome to you.

CASE II.—M. H., a healthy-looking married woman, aged 50, of sanguineous temperament, applied on account of a cough, in the endeavour to remove which she had spent much and profited nothing. She had suffered from it for eighteen months, during which period it had varied in force and frequency. At the time of her application, the cough seemed to be becoming worse. Her voice was unaltered. The cough was laryngeal in character and most distressing. Failing to discover any cause for it, on carefully examining the lungs and other viscera, I illuminated her larynx by means of a Tobold's condenser, and obtained a good view of the vocal organ by the aid of the laryngeal mirror. Nothing abnormal could be detected, if a slight exaggeration of the usual rose tint of the parts be excepted. Observing that she was somewhat deaf, I made some inquiries respecting her ears. She informed me that her right ear had given her some annoyance for nearly two years. The symptoms of which she complained were those of an accumulation of cerumen. She had, from childhood, noticed that, on cleansing her ears, a feeling of irritation in the throat and a cough were often excited. On making an examination of the auditory canal, a large plug of hardened wax was found, and removed by means of injections. The appearance of a small quantity of purulent discharge led to the discovery of a small oval ulcer on the floor of the canal, about one-eighth of an inch from the tympanic membrane. The almost immediate relief of the cough was remarkable. After two or three applications of a solution of nitrate of silver to the spot of ulceration, cicatrization was complete, and, in a few days, she was not only entirely free of the aural affection, but of the troublesome cough it occasioned.

CASE III.—N. W., a young lady of nervous temperament, aged about 22, of somewhat anæmic aspect, consulted me respecting her ears, as she suffered from deafness. Without entering into the history of the affection, which came on as a sequel to scarlet fever, it will be sufficient for me to state that the Eustachian tubes were the seat of chronic inflammatory action, leading to obstruction. She had been deaf for two or three years, and had apparently exhausted the resources of orthodox

medicine in the part of the country where she resided. Under these circumstances, her parents, with some considerable hesitation, allowed her to consult an advertising quack. This man ordered her to employ some drops, which appeared to be composed of spirit of cajepout oil, or some other spirituous irritant. The result of this application to the auditory canal was the production of a great amount of irritation, closely resembling an eczema. This irritation, which seemed most intense along the floor of the canal, was accompanied by a cough. I need hardly say that, as soon as the young lady came under my care, these pernicious drops were immediately thrown away, and my sole endeavour consisted in repairing the mischief occasioned by them. The cough could not be accounted for by any visceral affection, and was ascribed by me to the irritation of the nerve supplying the auditory canal, in one who was the subject of the peculiarity already adverted to. In about a fortnight or three weeks, the eczematous condition of the external auditory meatus had disappeared, and the accuracy of my diagnosis was established by the subsidence, *pari passu*, of the cough.

CASE IV.—Toynbee, in his *Diseases of the Ear*, refers to a patient under his care who suffered from a most intractable cough. He had a portion of dead bone in his auditory canal, which was removed. The withdrawal of this source of irritation was attended with an immediate disappearance of the cough, which no remedies had been enabled to subdue.

But I will not weary you with a narration of any more cases of ear-cough, because you can easily *ab uno discite omnes*. The number of cases of ear-cough which I have had under my care since I have been in practice, a period of three and a half years, is seven. This may seem to you a very small handful; but is, perhaps, not so when it is remembered that, since my attention has been especially directed to this subject, I have not placed myself in the way of cases, by attendance on the practice of Hospitals or Dispensaries for Diseases of the Chest and of the Ear.

Before entering on the consideration of the mode in which ear-cough is produced, it will be necessary to make a few remarks with reference to the nervous supply of the auditory canal. Strange as it may appear, it would seem that there have been erroneous ideas prevalent as to the source whence its nerves are derived. Romberg, whose opinion is endorsed by the late Mr. Toynbee, states, that the auricular branch of the vagus nerve is distributed to the external auditory meatus, and that this nerve is concerned in the production of a cough when that tube is irritated.

Now, the best anatomists inform us, and their views have been confirmed by my own dissections:

1. That the auditory canal is supplied with nerves from the auriculo-temporal branch of the inferior maxillary division of the fifth cranial nerve. They are two in number, and enter the interior of the meatus between the osseous and cartilaginous parts.

2. That the auricular branch of the vagus is one of the several nerves which find their way to the external ear, this particular nerve being distributed to the posterior part of the pinna.

The other cranial nerve which takes part in the production of the sympathetic phenomenon, that we are considering, is of course the vagus, which alone supplies the larynx, by means of its superior and inferior laryngeal branches. It is well known that an impression at the peripheral extremity of a sensitive nerve may produce such a change in that part of the nervous centre from which it arises, as to excite a motor or sensitive nerve implanted near to it; and, that, if a sensitive nerve be stimulated at its origin, a sensation is produced which is referred to its peripheral extremity. As examples of reflected sensations, may be instanced: *a*. The otalgia which often accompanies a tooth-ache, and which is relieved by the introduction into the auditory canal of a little laudanum or chloroform; *b*. The pain over the brow sometimes induced by the swallowing of ice or cold water, or others by a derangement of stomach digestion.

If the sensation which is reflected be powerful, a reflex action is sometimes excited, in consequence of the irritation induced. The feeling of irritation in the larynx, as a result of the titillation of the nerve distributed to the auditory canal, which feeling of tickling often provokes a cough, supplies us with an example. The impression produced in the ear in those amongst whom this sympathy between the ear and the larynx is exhibited, is probably conveyed by the auriculo-temporal branch of the inferior maxillary division of the fifth cranial nerve to the deep origin of its sensitive root, which is in close proximity to the deep origin of the vagus in the floor of the fourth ventricle. Here, a change is in all probability effected, which results in the stimulation of certain of the sensitive fibres of the vagus nerve. A sensation is produced by this stimulation, which is referred to the peripheral extremity of the superior laryngeal or sensitive nerve of the larynx. If an oft-repeated or powerful sensation is reflected, the irritation induced

excites the reflex action of coughing, to free the larynx of the supposed irritation.

The cough arising from an irritation of the dental branches of the fifth nerve, which may occur at any age, but is generally seen in children who are teething, is occasioned in a precisely similar manner.

The reason that the superior laryngeal nerve should be generally involved in the sympathetic sensation, rather than any other branch of that widely distributed nerve—the vagus, is not very apparent. We may suppose the cough evoked to be a sort of signal pointing to a cause which requires removal. An analogous supposition may be advanced relative to the occasional production of brow-ache, on the reception of cold water into the stomach. Here, a reflected sensation of pain at the distribution of a particular set of branches belonging to the fifth nerve, draws attention to an irritation of the gastric branches of the vagus. With reference to the implantation of the roots of the fifth cranial nerve and the vagus, it may be observed, that Stilling, in his work on the *Medulla Oblongata and Pons Varolii*, describes certain special deposits of grey matter or nuclei in the floor of the fourth ventricle, and states, that they are the deep origins of the spinal accessory, vagus, glossopharyngeal and hypoglossal nerves.

The following question may here arise in our minds:—"How is it that, amongst these several nerves implanted so near to each other in the floor of the fourth ventricle, the vagus should be, so to speak, selected?"

Stilling, in laying down the relative positions of the roots of the above mentioned nerves, places the nuclei of the vagus and glossopharyngeal in juxtaposition, and gives drawings to illustrate their connection. Langenbeck and Förg hold, however, that the accumulation of grey matter, considered by Stilling to be the deep origin of the glossopharyngeal, is not so, but that it is, in truth, the nucleus of origin of the greater or sensitive root of the fifth nerve. Although unanimity of opinion does not yet prevail as to the exact origin of the greater root of the fifth nerve, it would seem to have been traced, beyond a doubt, into the floor of the fourth ventricle, from the lower part of which the vagus arises.

The superior laryngeal nerve is not the only branch of the vagus to which an impression is propagated by an irritation of the auditory canal; for, as we have seen by the quotations from the works of Pechlin, Romberg, and Toynbee, sickness is occasionally produced.

Vomiting is an act which is not only occasioned by an irritation of the gastric branches of the vagus, as when induced by emetics, but by an excitation of the cranial origin of this nerve, as is seen in cases of cerebral injury or disease, etc.

Although I have not yet seen ear-cough accompanied by vomiting, it seems probable that this action may now and then be thus excited in these cases.

The majority of aurists omit in their works any mention of the intimate sympathy between the ear and the stomach. Cases continually arise, however, where a derangement of the digestive organs is the sole cause of deafness. Yearsley, in his "Deafness practically illustrated", treats of "stomach deafness", and justly wonders at the omission, especially when the sympathy between the eye and the stomach has been so long recognised, in the occasional production of amaurosis in connection with dyspeptic disorders.

Arnold furnishes us with an interesting example of this sympathy between the ear and the stomach, in the case of a child who suffered from chronic vomiting which defied for a long time all curative measures, but was immediately removed on the extraction from each ear of a bean, which had been introduced in play.

In conclusion, the observations which I have had the honour of presenting to this meeting, may be thus summed up.

1. From amongst the unknown group of idiopathic coughs, may happily be rescued from obscurity a cough which is excited by an irritation of the meatus auditorius externus in certain individuals.

2. The persons referred to are those who possess a hyperæsthetic condition of the nerve supplying that canal, and in whom any slight titillation of this nerve induces a feeling of tickling in the throat.

3. This hyperæsthetic state generally exists in both ears, sometimes, however, only in one, and occurs in about twenty per cent. of those examined.

4. Its existence can usually be traced back to childhood, and is probably a congenital peculiarity.

5. That the nerve of the ear concerned in the production of ear-cough is not a branch of the vagus, as Romberg and Toynbee have affirmed, but is a branch of the auriculo-temporal branch of the fifth cranial nerve.

6. This sympathy between the ear and the larynx is an example of a reflected sensation in which the connection between the nerves involved takes place in the floor of the fourth ventricle.

7. Vomiting is occasionally, but rarely, the result of the application of an irritant to the nerve distributed to the auditory canal.

The diagnosis of disease and the therapeutical effects of drugs would seem in these days to eclipse in importance all other departments of medical science. Without a diagnosis, all treatment is uncertain; and without a knowledge of the actions of drugs on the body, in health as well as in disease, together with the changes they undergo during their passage through the system, the administration of these drugs is simply empiricism. Diagnosis and therapeutics are two of the foundation stones of our art, which open up to our view unexplored mines, whose contents are of inestimable value to human life. Strive as we may, however, to bring to light these hidden treasures, we shall find, as Sir Isaac Newton and others long ago discovered, that, the more we learn, the more vast appears the unknown world of knowledge.

OBSTETRIC MEMORANDA.

[UNDER this head, we shall, from time to time, as materials come to hand from correspondents, publish records of cases remarkable in themselves, or illustrating points of interest in obstetric practice, therapeutic or manipulative. We shall probably in this way preserve from oblivion the notes of very many useful and instructive occurrences in private practice; for the great obstetric experience is that—for the most part hitherto unwritten—of the great body of general practitioners throughout Great Britain. We will only ask those who may forward cases for record, to relate them with the utmost brevity, and equally to condense any appended remarks.]

CASE OF TWINS, ONE CHILD WHITE, THE OTHER BLACK.

By WASDALE WATSON, Newport, Monmouthshire.

ON November 24th, 1868, at 7 P.M., I was hastily summoned to Mrs. S., in her fifth labour at term, who was stated to be flooding profusely. I found her blanched, almost pulseless, lying on her back, and in a state of great nervous excitement. On examination, I found the vertex presenting, the os dilated to the size of a half-crown, soft, and a piece of the placenta pushed down by the side of the head; this slipped back easily, on a little pressure. The hæmorrhage having ceased, and there being no pain, I administered a dose of powdered ergot in hot water and brandy, waited an hour, and then left, with directions to sent for on the recurrence of pain, which occurred at about 11 P.M. On my arrival I found the pains coming regularly every few minutes, and the head descending gradually. In about an hour the child (white) was expelled; and I immediately ascertained that there was a second presenting by the breech. The pains being strongly propellent, I ruptured the membranes, and in about half-an-hour the second child (black) was born. The placenta, a single large one, was thrown off quickly. The mother, and children, (both females) did well. I may mention that the husband was a mulatto.

SUCCESSFUL REDUCTION OF PROLAPSED FUNIS BY THE POSTURAL METHOD.

By JOHN BRUNTON, M.A., M.D., Surgeon to the Royal Maternity Charity.

IN THE JOURNAL, last year, I narrated a case of successful reduction of prolapsed funis, by the postural method, in which the child was delivered alive, I now record another case, in which the reduction was successful at once, though the child was born dead; the death of the child obviously resulting from other causes.

On October 26th, 1869, I was called to attend Mrs. H., aged 27, in labour with her first child. She had been ill for ten hours, and her pains were active, occurring every few minutes. On examination, I found the os uteri dilated to the size of a crown-piece, the head presenting, a bag of membranes protruding, and in this bag was a loop of funis. This I deemed it proper at once to reduce, in case pulsation still existed, though I had not detected it through the membranes. Placing the patient on her knees in bed, with her head as low as she could put it, I partly introduced my hand into the vagina, ruptured the membranes, and just as pain came on I pushed up the loop (now about six inches long) alongside the head; and, as the head was pushed down by the pain, the cord was reduced. No prolapse afterwards occurred. Some hours afterwards, I delivered the child by forceps, on account of a very narrow pelvic outlet. The child was dead. The mother had not felt any foetal movements for several days. The placenta was calcareous, and in some parts fibrous; during labour, as the liquor amnii escaped, it was thick with meconium. The mother made a good recovery. By withholding fluid, and allowing a liberal supply of ice to allay her thirst, little or no milk formed in her breasts.