

**On the use of so-called expectorants in diseases of the mucous membrane of the lungs : being remarks suggested by Professor Gairdner's recent article "On the action of expectorant remedies" / by J. A. Easton, M.D.**

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ON THE  
USE OF SO-CALLED EXPECTORANTS  
IN  
DISEASES OF THE MUCOUS MEMBRANE OF THE LUNGS;  
BEING REMARKS SUGGESTED BY PROFESSOR GAIRDNER'S RECENT ARTICLE  
"ON THE ACTION OF EXPECTORANT REMEDIES."

BY

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IN the *Glasgow Medical Journal* for last July there is an article by my esteemed colleague, Dr. W. T. Gairdner, on the action of expectorant remedies, which, though distinguished by the writer's usual ability, and containing many opinions with which all will agree, is rather deficient, as appears to me, in those practical lessons which might have been expected from such an author, writing on such a subject, and is at variance, moreover, with certain doctrines "which are most surely believed among us" to be incontrovertible truth, and which I for one have taught to the best of my ability, during the last twenty-three years, in both branches of the Glasgow medical school. It is due therefore, I think, to those numerous practitioners scattered throughout the world, in whose education I had the happiness to take a part, and whose opinions consequently I may have had some share in forming; it is due, also, to our medical school and to those who may resort to it hereafter—that there be as little discrepancy as possible in our teaching, and more particularly that the doctrines inculcated regarding expectorants should be reconsidered, so that errors may be corrected and the truth held forth and maintained. Under these convictions I shall now proceed, as briefly as the importance of the subject will admit, to review, by the light of Dr. Gairdner's paper, the current doctrines of the schools regarding so-called expectorant remedies, with the best



feelings certainly towards my accomplished friend, but at the same time with that independence of thought and freeness of speech which spring from a sense of responsibility, and of which qualities he has given us many excellent examples in more than one field of medical investigation.

There is a story told of an ingenious tailor, who devised a plan by which he was able to rectify all the errors of careless or unscientific cookery in the matter of eggs for the morning repast. This notable discovery, like many others which have made a greater noise in the world, was extremely simple, and consisted in the liberal employment of butter as a corrective of all the aberrations of *Oval* cookery; and hence, as the story goes, our sartorial philosopher, having great faith in his specific, used butter to soften his eggs when overboiling had made them too hard, and butter also to give them consistency when underboiling had not made them hard enough. Pretty much after a similar fashion do many comport themselves regarding expectorants; and hence, in the most opposite conditions of the aërian membrane, no matter whether it is congested and dry, no matter whether it is relaxed and moist to overflowing, the so-called expectorant—the sartorial butter—is had recourse to, and in either case with the most perfect reliance on its adaptation to the most opposite pathological conditions, and on its efficiency to produce the most opposite therapeutic results. Such being too frequently the case, it is gratifying, in commencing this review, to find in Dr. Gairdner's paper a common ground of agreement, from which, as from a general stand-point, the whole subject may be viewed in all its aspects. Most truly does Dr. Gairdner affirm, that the diverse theories which have been promulgated regarding the action of so-called expectorants "involve the unsatisfactory, if not unintelligible conclusion, that expectoration is equally promoted by the most opposite physiological conditions," and that in those totally different morbid states in which so-called expectorants are administered, we may "fairly doubt whether the result of such opposite methods of remedial action can be truly expressed under a single therapeutic term, or can form the basis of a good classification." In these remarks Dr. Gairdner exposes the root of those errors that have crept not only into our nomenclature, but, what is far worse, into our practice; but in place of "fairly doubting" with him whether the single term expectorants can be applied with propriety to those means which we employ in the treatment of different and totally opposite diseases of the mucous membrane of the lungs, I have no hesitation in saying, that in certain circumstances such a term is a complete misnomer. Nay further, I maintain that it is now high time we should free ourselves from the trammels of use and wont, and frame terms,



however circumlocutory, inelegant, and uneuphonious, which should truly express the different physiological actions that are produced by the various remedies which we have recourse to in the diseases of the aërian membrane. And though I should only get laughed at for my pains, I shall now make that attempt.

In order, however, to make even an approximation to success in this effort, it will be necessary, at the risk perhaps of wearying the reader by reference to familiar facts, to remind him in a sentence or two of the condition of the aërian membrane in the state of health, and how that membrane is altered by those acute and chronic diseases of which it is so frequently the subject, and for the removal or mitigation of which the so-called expectorants are chiefly administered. In the state of health, as the reader well knows, there is a secretion always taking place from the pulmonary mucous membrane, for the purpose of lubricating the air passages, of protecting the delicate tissue which lines them from deleterious agents, and no doubt for the purpose, also, of getting rid of noxious materials. Now, in the normal state, this secretion is disposed of by ciliary motion, by evaporation, and by absorption. Whether "peristalsis" is concerned in its disposal, is a question which will be considered afterwards. This, then, is what is constantly going on in the membrane while it is in the normal state, and these are the means whereby the secretion is normally disposed of; and I may here remark, though it is somewhat anticipatory of what follows, that while I perfectly agree with Dr. Gairdner that many agents in the *materia medica* do good service by the "energizing," as he terms it, "of some function more or less constantly in action," I suspect, that when disease is set up, when the structure that performs a particular function becomes morbidly altered, and the function is altered in consequence of the structural change—I suspect, I say, that something more is *then* required than merely to "energize" the natural function. And here I observe, once for all, that as my principal object in this paper is to discuss the subject of which it treats in its practical, that is, in its pathological and therapeutic bearings, I shall not refer to merely theoretical and physiological speculations any more than what is deemed necessary for the elucidation of the former. Returning from this digression, and passing from the description already given of the aërian membrane in its normal state as regards its secretion, the next point for consideration is, how the membrane is altered when it becomes the seat of morbid action. This structure, as every one knows, is liable to acute and chronic disease, and the alterations produced by these respective morbid processes may now be looked at in the order which has just been named:—



1. *Of the acute form.*—When the mucous membrane of the lungs becomes congested or inflamed, as it does in catarrh or acute bronchitis, its secretion is greatly diminished, often all but suspended, and the membrane, from being moist, becomes dry and harsh, assuming a state not unlike that of the skin during an attack of fever. Now, the first indication of cure under such circumstances, is to *alter* the unnatural condition of the membrane. Disease has affected its structure, has checked its function, and our object should be to restore matters to their normal state. Surely this cannot be done by “energizing the natural function” of the inflamed and now dry membrane, and the attempt to reproduce the natural condition by the administration of so-called expectorants is simply impossible. If there be any meaning in words, the term expectorant denotes an agent which extrudes something abnormal from the chest; but how can we do so by squill, or any other agent, if the chest for the time being has no such thing to extrude? Squill—and I select squill as typical of some others of the class—being an irritant, does much harm, I believe, by increasing the congestion of the membrane already too great; and yet how many are there who prescribe this medicine in every kind of cough, no matter what the cause is that has produced it, and who think that no “cough mixture” is perfect which does not contain squill! So far, therefore, from attempting the impossibility of causing expectoration when there is nothing to expectorate, our treatment should be directed to overcome the congestion; to restore the suspended secretion of the pulmonary membrane; to establish from it, as it were, a kind of internal diaphoresis; in short, to “melt, thaw, and resolve” it back again to the state of health. And if we succeed in doing this, what else have we done than *altered* the inflamed membrane, and *thereby* restored healthy character and function? Nay more; when the same membrane is the seat of chronic disease, when it is relaxed, and pouring forth muco-purulent secretion, and when by appropriate treatment we restore the tissue to its normal condition, what else have we done, under these opposite circumstances either, than *altered* the morbid state? Seeing, then, that some medicines relax the aërian membrane when it is constricted, and that others constrict it when it is relaxed—that is, that they *alter* it—might we not with perfect propriety apply to such agents the term Broncho-muco-alterants, and subdivide these again into those which are relaxing, and those which are stimulating in their effects? BRONCHO-MUCO-ALTERANTS! *Risum teneatis, amici!* The term is certainly a roundabout one; it is inelegant; it is not classical; perhaps it is grating: but I submit that it is not inaccurate; it is not misleading; it shadows forth a definite morbid condition; it suggests the proper treatment, while it implies no



paradox, and involves neither physiological nor therapeutic impossibility. The means, then, which are likely to remove the congestion of the mucous membrane, as it exists in catarrh and acute bronchitis, and consequently to bring back the secretion in normal quantity, are chiefly ipecacuan, tartar emetic—not given in their emetic doses, but as sedative relaxants—as also, henbane, hemlock, aconite, the green hellebore, and hydrocyanic acid, combined with the frequent inhalation of steam. From the inhalation of vapours great benefit may be expected; but in the acute condition of the membrane now under consideration, steam, in my opinion, is preferable to all other vapours, several of which—such as that of vinegar, so often employed—are too irritating, and on that account likely to be injurious. On the same principle, and to fulfil the same indication, the temperature of the sick-chamber should be kept pretty equably at or about 60° F., and as few currents as possible of cold air should be allowed to pass through it. A very good improvised method of diffusing warm air through the bedroom, is to keep one or more large kettles or small boilers, filled with water at the boiling point, on the fire, especially towards evening and during night, when the temperature becomes lower. The administration of gum-arabic and other demulcents should on no account be omitted, while benefit may be expected from the resolvent properties of the alkalies, especially the bicarbonate of potash, and the aqua potassæ. Counter-irritation in some cases may be required, in the form of stimulating embrocations, sinapisms, or even a blister. Now, in our systematic treatises, several of the above-named articles of the *Materia Medica*—which should be given to act merely as sedative relaxants—are set down as expectorants; and therefore I put it to my professional brethren whether, in the circumstances, such a term is not an obvious misnomer—is not suggestive of erroneous notions both as to pathology and therapeutics—and whether that of relaxing broncho-muco-alterants might not be substituted as correctly expressing the therapeutic results which these remedies really induce?

It is time now to consider the changes that take place in the ærian membrane when it is the seat of *chronic* disease, and what means are necessary for the removal, or at least the palliation, of the chronic malady. It is well known that though young persons have no immunity from this form of pulmonary ailment, it more generally—as one of its synonyms, *tussis senilis*, indicates—attacks those who have made considerable progress in the journey of life, and that a lower tone of the system generally, and laxity of the ærian membrane particularly, with excessive secretion, often muco-purulent, as the effect of the laxity, are the pathognomonic features of the complaint. If this be a true repre-



sentation of the pathological condition, then there are two indications of cure, as it appears to me, which force themselves on our attention. Going to the root of the evil, our main effort should be to *alter*, or, to use the language of the schools, to raise a new action in, the atonic membrane, and while employing such means as are known to produce this local effect, we should pay attention to the state of the general system, remembering that if it is atonic too, as it frequently is, the means which are required for bracing the system generally are often of great service in bracing the pulmonary membrane likewise. The second indication of cure—subordinate, no doubt, to that just mentioned, but still very important—is to get rid of the redundant and vitiated secretion, and thus, for a time at least, to relieve dyspnoea, or obviate, it may be, impending suffocation. In discussing these two indications of cure, I shall, for reasons that may appear in the sequel, invert the order now given, and shall first consider how the vitiated supersecretion is extruded. As this is a part of the subject on which I am sorry to dissent very decidedly from Dr. Gairdner, I shall consider rather fully what he adduces regarding coughing and bronchial peristalsis, in connection with the removal of excessive secretion from the mucous membrane of the lungs while under the influence of chronic disease. And, first, of coughing:—

“The facts both of physiology and therapeutics rightly interpreted,” says Dr. Gairdner, “lead to the inference, that coughing is by no means a necessary part of the act of expectoration, but rather a consequence and a demonstration of the failure of that act to be performed in the normal and undemonstrative manner in which it goes on in health.” Now, I begin by taking exception to the premises which are here laid down, and I assert, without fear of contradiction, that expectoration, *in the conventional sense in which that term is employed by the members of the medical profession*, is not “an act which goes on in health” at all, and that the processes by which the natural secretion of the pulmonary mucous membrane is removed, have no analogy whatever with those which are called into action when that secretion becomes vitiated, redundant, and obstructive, in consequence of disease having been set up in the secreting surface. The excrementitious mucus of health is got rid of, as already stated, by ciliary motion, evaporation, and absorption; and *these* processes are certainly “undemonstrative,” “noiseless,” “go on without our consciousness,” and require no “expectorant remedies” to quicken them into activity. Though it is quite unnecessary, I dare say, to bring forward authority in support of the assertion that expectoration is not an act of health, there can be no harm in presenting the following pithy remark of Dr. Graves, which



he gives with all the emphasis of *italics*:—"A perfectly healthy person, breathing a pure air, has no expectoration whatsoever."\* Dr. Gairdner, however, says otherwise; and indeed from the extract given above, as well as from other passages and phrases, such as "normal expectoration," &c., we would almost suppose that his object in this able and ingenious paper was to favour us with a dissertation merely on certain processes, the existence of which he assumes, and to withhold from us the benefit of his ample experience regarding the best modes of combating diseased action. And yet, though the doctor expressly states that expectoration is "normal," "an act which goes on in health," I rather suspect he has some misgivings of the soundness of his own theory, and that after all he looks upon expectoration very much as we all regard it, as an abnormal act, an accompaniment and an effect of disease. And if I am asked the grounds of my suspicion, I adduce no other testimony in confirmation, than the title of the doctor's paper—"On the action of Expectorant Remedies." They that are whole need no physician; and where there is no disease, there is no need of remedy. If expectoration is "an act of health," how *can* there be "an expectorant *remedy*?" Surely my excellent friend does not suppose that matters can be made better than they are in health? If he does, he cannot believe with the poet that it "is wasteful and ridiculous excess"—

"To gild refined gold, to paint the lily,  
To throw a perfume on the violet,  
To smooth the ice, and add another hue  
Unto the rainbow."

While expectoration, however, is not performed and "expectorant remedies," consequently, are not needed during health, matters become totally different when we come in contact with the effects of chronic disease. And here, I would appeal to every practical man, I would appeal to Dr. Gairdner himself, if in his great experience as a physician, in hospital practice or elsewhere, he ever saw a case of chronic bronchitis, in which the act of coughing was not the precursor of the act of expectoration? Do not the subjects of that disease often tell us of their own accord, that since our last visit they had been very breathless, but that after a fit of coughing—a bout of coughing, as some call it—the *stuff* came up, and *then* they got relief? When by the injudicious use of opium the contractility of the respiratory muscles has been impaired, and the cough for a while suspended, has not the victim of chronic bronchitis paid dearly for the temporary cessation of his cough in the loading of his bronchial tubes with mucus, and the consequent agony of dyspnoea? It would be cruel mockery

\* Graves' Clinical Medicine, vol. ii., p. 8.



to congratulate such a man on his cough being "relieved." Of course I do not say that the existence of cough is not to be deplored, or rather that the pathological condition of which it is one of the effects is not to be deplored; but I hold that the cough is a necessity in connection with expectoration and the relief of dyspnœa, and in that sense to be regarded as a salutary necessity, and that, while the main object of our treatment should be to restore the diseased membrane to its healthy condition, and thus get rid of cough, dyspnœa, and all attendant evils, we are bound, until that happy result is accomplished, to content ourselves with palliatives suited to the emergency, and to adopt all those means which science suggests and experience warrants to help the patient in the act of coughing, and thereby make that act efficient for expectoration, and the consequent relief of dyspnœa.

It being admitted then—as I think, with all due deference to my friend Dr. Gairdner, it must be admitted—that coughing is a "necessary part of the act of expectoration," we may now look at the matter practically, and inquire how far, and by what means, we can promote that act. And in order to rest the inquiry on the proper basis we must remember that coughing, like sneezing, sighing, yawning, sobbing, is nothing else, as Carpenter tells us, "than a simple modification of the ordinary movements of respiration, excited either by mental emotions, or by some stimulus originating in the respiratory organs themselves." "Coughing occurs," he remarks further, "when the source of irritation is situated in the back of the mouth, in the trachea, or bronchial tubes. The irritation may be produced by acrid vapours, or by liquids and solids that have found their way into these passages; or by secretions which have been poured into them in unusual quantity, as the result of disease; or by the simple entrance of air (especially if cold) when the membrane is in a peculiarly irritable state. Any of these causes may produce an impression on the excitor fibres of the pneumogastriæ, which, being conveyed to the medulla oblongata, gives rise to the transmission of motor impulses to the several muscles, that combines them in the act of coughing."\* Now, it is clear from this that coughing is effected by certain muscles which are under the control of the pneumogastric nerve; it is clear also that the act may be excited, and if so, unquestionably it may be helped. Stimulating embrocations, and the operations of sponging and friction applied in the track of the pneumogastric nerve and over the respiratory muscles, or a stimulus applied directly to the afferent branches of this nerve, which are spread out upon the mucous membrane of the larynx, convey an impression to the medulla oblongata,

\* Carpenter's Physiology, pp. 523-4-5.



happily called the respiratory ganglion, and thence is transmitted to the several muscles which are concerned in the act of coughing. On this subject I shall submit an extract or two from the lectures on expectorants which I have been delivering during the last twenty-three years; premising, however, that, for reasons to be given afterwards, I do not adopt the notion of "bronchial peristalsis," which Dr. Gairdner tells us, he "brought under the notice of the profession for the first time in 1851." As I am in the habit of lecturing from notes, and to a considerable extent extemporaneously, *the words* may not be reproduced exactly, but I am certain that many old pupils can attest that the *thoughts* are; and I have to apologize to the general reader on account of the *copia fandi* and colloquialism of expression which many years' teaching has engendered, and which, I fear, it is now impossible for me to give up. The remarks that follow occur in connection with the value of sponging and friction of the chest, in those cases of chronic bronchitis in which these means can be practised with safety:—"But though such operations are of service in bracing the ordinary muscular apparatus which is brought into play during what is called forced or voluntary breathing, it would be improper not to remind you that there are muscular fibres in the lungs themselves which *may* be of *some* service as adjuvants in this respect, and that these cannot of course be operated on by any such external applications as sponging and friction. The muscular fibres of the bronchial tubes, demonstrated by the anatomical minuteness of Reisseisen, though taking a part no doubt in the general respiratory act in some way which it is not our province to inquire into, may also, perhaps, help to eject accumulated and offending matter from the bronchi; but it is obvious that when there is muscular weakness generally, these small muscles, like the large ones on the outside, will be weak also, and thus be incapable of vigorous contraction. Here, then, let us once more return to that beautiful provision of nature, by which we enjoy the benefits of voluntary breathing and its associated acts, as well as of involuntary, so that while respiration—so essential to life—cannot be suspended even for a moment by the vagaries of a faculty so capricious as volition, which might be the case were this important function entirely under the dominion of the will; while, I say, this catastrophe has been provided against, we can still avail ourselves of all the advantages which result from our having a partial control over the respiratory movements. Now, while sponging and friction of the chest repair the ordinary muscular apparatus of breathing, and thereby make it more efficient for the expulsion of excessive muco-purulent secretion, it is *possible* that the external muscles may be assisted in this work by a stimulus being conveyed to



the fibres of Reisseisen, through an impression on the fibrillæ of the pneumogastric nerve spread out upon the mucous membrane of the larynx. Such a stimulus may be said to be applied directly to these fibres by the inhalation of *slightly* irritating vapours, of which those of benzoin and of the balsams of tolu and peru, lately under consideration, seem to possess just the requisite amount, and no more, of the exciting material. So you observe that these substances, in addition to possessing the more valuable and important property, already noticed, of raising a new action in the relaxed ærian membrane, may conduce to expectoration also, and after this manner:—They stimulate the afferent laryngeal filaments, and this stimulus, passing along to the efferent twigs of the bronchial tubes, may restore the energy of their muscular fibres, and thus the peccant humours may be expelled from lodgings which they had no right to occupy. Thus is it that the internal muscles, as well as the external, may be excited to increased activity. . . . Having already explained to you that we can cough when we like—though we may not like to cough—you at once perceive how valuable this power of voluntary coughing must be to him whose bronchial tubes are loaded with mucus. But coughing, as already remarked, is a muscular effort, and advanced years, debility, long-continued disease, may have impaired the strength necessary for such a purpose, to restore and invigorate which the rapid sponging of the chest with cold water and rapidly drying it by the friction of a coarse towel, not by fits and starts, but with persevering regularity, will be found beneficial; it being understood, as I have already said, that this means can be availed of in those cases only in which experience has shown that it may be employed with safety and advantage.”

The physiological exposition which has been presented in the foregoing paragraph indicates, as I conceive, those palliative measures—and at present I speak of none other—which should be resorted to for the relief of the dyspnœa that depends upon accumulated muco-purulent secretion in the bronchial tubes. Let these measures, however, be estimated at their real value. It is not claimed for them that they operate *directly* on the structure which is the seat of the morbid action. Beyond doubt, they do good service as accessories, but they are not the radical means of cure. Their object being to promote expectoration—that is, to remove the *effects* of the disease in the only way in which these *can* be removed—the basis of the treatment, in *this* relation, is to invigorate the general system; and hence we should have recourse to all those hygienic and medicinal appliances which conduce to that general result. Foremost, perhaps, among the former, attention should be paid to the salubrity of the air which the



patient breathes. Not a relaxing, and certainly not a cold climate either, but a temperate and bracing one should be selected; and a residence well drained, well aired, free from damp, and protected from the east wind. The use of nourishing, easily-digested food, along with such exercise in the open air during dry weather as shall be recreative, should be enjoined; and as already mentioned, in those cases in which it is borne well sponging and friction may be applied, and stimulating embrocations may be rubbed not only over the chest, before and behind, but on the nape and along the sides of the neck, and also at the epigastrium, in order that the pneumogastric nerve may be attacked at all those assailable points where it comes nearest the surface. Tonics and stimulants are invaluable. Of the former, while all of them may be useful, most reliance, I think, should be placed on nux vomica, iron, and cinchona—agents which are known not only to be excellent general tonics, but to be specially efficient, likewise, in exciting and renovating muscular contractility. With the object of bringing out both of these actions, I have been in the habit of late of prescribing, in doses of a tea-spoonful three times daily, a syrup composed of the phosphates of strychnia, iron, and quinia, each of the above doses containing the thirty-second part of a grain of phosphate of strychnia, and one grain respectively of the phosphates of iron and quinia. I submit to my professional brethren that the above combination is worthy of their notice, as a general tonic and special muscular excitant. The syrup of the phosphates of iron and manganese, also, is conducive to similar results. Of stimulants, sesquicarbonate of ammonia is highly efficient, and, if necessary, a moderate allowance of alcohol in the form of hot toddy should not be denied. Combined with these, the inhalation of *slightly* irritating vapours may be enjoined with every prospect of benefit, and I think there are none better than those which have been named in the foregoing paragraph; and to these may be added the vapours of vinegar, turpentine, diluted chlorine, and iodine. Now, I submit that it is to these and similar agents that the term expectorants—if it is to be retained—ought to be restricted, as being the means for exciting the act of coughing, which, I repeat, is the essential precursor of the act of expectoration. But as expectorants is a very vague term, one often misapplied and therefore misleading, might we not frame a more significant designation, one that should truly and intelligibly express the physiological act which is really excited; and therefore, as the medicines named above *excite respiratory muscular fibres*, might we not—using the word *πνευμων* as meaning the “organ of breathing”—with perfect propriety call all such agents, when given in this special relation and for this special purpose, by the name of PNEUMO-MUSCULO-EXCITANTS? By so doing,



the vague, fallacious epithet expectorants would be got rid of altogether. But in connection with the subject of muscular movements it is now time that we pass on to the consideration of what Dr. Gairdner calls bronchial peristalsis.

*Ex nihilo nihil fit*, is an axiom from the absolutism of which there is no escape. It is more absolute by far than a Russian ukase. When, therefore, my respected colleague, Dr. Gairdner, speaks of "peristaltic action" being performed by the muscular fibres of the bronchial tubes, and says "this idea, I believe, under the name of a 'deobstruent function of the lungs,' was brought under the notice of the profession for the first time by me in 1851," he must permit me to remark that he discovered a function for the performance of which nature has not provided the necessary, the essential structure. Had he ascribed to these fibres the single power of circular contraction, and consequent narrowing of the bronchi, no exception, of course, could have been taken to such an opinion; and were it not for his own explicit statements, frequently repeated, as if to guard against the possibility of mistaking or even doubting what he means, it would be difficult to believe that a person of Dr. Gairdner's acknowledged powers of observation and analogy could have seriously entertained the "idea" of bronchial peristalsis. But that we may be in no doubt as to his real meaning, take the following from several statements of a similar kind. Referring to "regular peristalsis" as it is conducted "in the intestines, liver, and uterine organs," he says, "We know the mechanism by which the foetus is expelled from the long tortuous uterus of the lower animals, and we know that it is a similar mechanism which accomplishes the regular transit of the fœcal matter, with the superfluous mucus, along the intestine, and which in disease dislodges a calculus from the liver or kidney. We know (?) that a *like apparatus* exists in the bronchial tubes, but physiologists have possibly not yet agreed in according to it a like function." It is perfectly true that harmony of opinion on this point does not yet prevail among physiologists, and I venture to affirm that fancy is not able to anticipate an era when it shall; and further, I have no objections to prophesy, that when physiologists "do agree" in according to the muscular fibres of the bronchial tubes the function which Dr. Gairdner has accorded to them, "their unanimity *will* be wonderful." Moreover, I take the liberty of adding that the "knowledge" about the "*like apparatus*" to which my friend refers is certainly not "running to and fro," but is confined, I rather think, to himself—at all events, either it has not *yet* reached the writer of these remarks, or, what is more likely, it has run past him. But perhaps it will make a "revolution," like the comets, and *then* he may be more fortunate.



Though the foregoing quotation is perhaps explicit enough for most readers as to the nature of the doctor's "idea," yet one other extract may be given to remove all doubt on the matter, even from the most sceptical. "Since 1851," says Dr. Gairdner, "I have, in teaching, constantly described the bronchial muscles as the 'scavenger muscles' of the respiratory tract, as performing for the lungs and bronchi the *same* service as the intestinal peristalsis in the case of the digestive tract, or that of the ureters and biliary ducts as regards obstructions in their respective canals. And following out the same analogy, I have regarded and described expectorant *remedies* as being for the most part exciters of the bronchial peristalsis, *in the same sense* as cathartics are exciters of the intestinal peristalsis, or as ergot of rye is an excitor of uterine action." Being one of Dr. Gairdner's colleagues, and teaching from year to year a different doctrine from that which he has here enunciated, it will, I trust, be readily believed that it is with deep regret I feel obliged to contradict all this, and to maintain that there can be no analogy between those physiological processes which my colleague refers to and the process by which "obstructions" are removed from the bronchial tubes; for where there is not the essential anatomical structure for performing peristalsis, of course peristalsis cannot take place. Peristalsis requires for its performance longitudinal as well as transverse muscular fibres, and it is by the regular, yet antagonistic contraction of both, that this movement is carried on. Now, Reisseisen, whose accuracy and minuteness of observation cannot be doubted, saw only transverse muscular fibres (*querliegenden Muskelfasern*) in the bronchial tubes. No doubt, he found longitudinal fibres too, but he tells us that the nature of these was not evident to him, was somewhat doubtful (*die Natur dieser Fasern ist mir etwas räthselhaft*); they were not exactly aponeurotic (*nicht bloss aponeurotisch*); in short, he contents himself with speaking of them as elastic, white fibres (*elastische, weisse Fasern*).<sup>\*</sup> From this account it is plain that these fibres are not muscular; and therefore whatever may be their structure, and whatever their use in the economy of respiration, it is manifest that not being muscular, they can take no part in those regular, alternate contractions which are characteristic of peristaltic motion, which are of its very essence, and which cannot be produced except through the agency of both longitudinal and transverse muscular fibres. But though the transverse fibres of Reisseisen, having no longitudinal helpmates, cannot conduct peristalsis, it were absurd to suppose that they are not subservient to some normal end, or that they have been placed where they are merely to be

<sup>\*</sup> Über den Bau der Lungen, von Franz Daniel Reisseisen, pp. 9, 10, 11.



called into action during the supervention of disease. Firmly attached, as Reisseisen has demonstrated them to be, to fixed points, varying in situation and kind as the bronchial tubes become finer and finer, but reaching to their very extremities (*sie sich auch bis an die Endungen der Luftröhre finden*),\* these muscular fibres are undoubtedly capable of narrowing the calibre of the bronchi, and thus very likely are serviceable—subordinate to the higher respiratory powers—in regulating the ingress and egress of air, and perhaps they may take a part along with ciliary motion, and the other means which were formerly mentioned, as being concerned in the disposing of the normal mucus of the aërian membrane. These may not be functions which Reisseisen's fibres perform in the economy of respiration; but as Nature has no place for drones, most assuredly she gets *some* work out of these tiny muscles; and hence we must all agree with Dr. Gairdner when he says, that it is an "unphilosophical predicament" we are placed in, if we suppose that they have been "endowed with contractility solely for the purpose of producing the asthmatic paroxysm." Yet though it is unphilosophical—unnatural rather, and impious—to suppose that the beneficent Author of our being had formed these fibres, and placed them where they are, solely for the purpose of producing either the asthmatic paroxysm or any disease whatever, it is not unphilosophical to believe that when disease *is* produced, they may to *some* extent at least be operated on for its removal. Of course I do not claim for them a high place in this respect, even as adjuvants—and they can be nothing more—but I do not think it is beyond the philosophical limits to say that it is not *impossible* that they may be of *some* assistance to those respiratory muscles proper, which are concerned in the act of coughing, when that act requires to be put forth in removing the redundant mucopurulent secretion which is poured out from the aërian membrane while under the influence of chronic disease. And this last remark leads us by a natural transition to the other indication of cure which was named first—the raising of a new action in the mucous membrane of the lungs, so as to restore it if possible to the normal state.

It should never be forgotten that excessive muco-purulent secretion into the bronchial tubes does not constitute chronic bronchitis, and that the removal of that secretion, though absolutely necessary to alleviate dyspnoea, or it may be to avert suffocation, merely relieves a symptom by operating on an effect, while the cause of all the evils is not even touched by such an operation. Temporarily to dislodge the vitiated supersecretion is good;

\* Op. cit. p. 9.



but permanently to alter the condition of the membrane, and to restore healthy structure and healthy function, is better. A part only of the work is done in the one case; the whole is done in the other. Therefore, when my excellent friend, Dr. Gairdner, tells us that he "regards and describes expectorant *remedies* as being for the most part excitors of the bronchial peristalsis, *in the same sense* as cathartics are excitors of the intestinal peristalsis, or as ergot of rye is of uterine action"—though he certainly does not say so in as many words, and though I am convinced he would act otherwise at the bedside of a patient—he undoubtedly leads us to infer, that the diseases of the pulmonary mucous membrane, in which the so-called expectorants are chiefly administered, require for their cure no other "remedies" than those which extrude the products of the morbid action. I may be in error; but it appears to me, after repeatedly going over his paper, and studying it with that care which is due alike to the importance of the subject and the deservedly high reputation of the writer, that the gist of the article is in this direction from beginning to end—that it is eloquent, though sometimes heterodox as well as eloquent, on the manner of dealing with an effect, but tantalizingly silent as to how we should operate on the cause; reminding us of those pulpit ministrations in which the preacher, after indulging largely and eloquently in doctrinal exposition, disappoints his hearers by sending them away without any "practical application."

Now, as "the practical application" is generally considered to be the best part of the discourse, I shall endeavour to supplement what my learned friend has omitted; and as he has invaded the province of the *Materia Medica*, he cannot blame me if I attempt, *non passibus æquis*, to make a raid into the domain of the Practice of Physic. And, in the outset, I would ask my fellow practitioners if, when called in the course of practice to treat a case of chronic disease in any mucous membrane, they should think they were doing justice to their patient, to their own reputation, or to medical science, if the expulsion of the vitiated secretion from the diseased surface was the only object of their solicitude, and if all their energies were put forth to achieve that single feat? When a practitioner treats a case of cystirrhœa, for example, how does he proceed? Does he proceed upon the principle that all that he has to deal with is the excessive muco-purulent secretion? No doubt he attempts to relieve the loaded bladder of its foul humours, as in a case of chronic bronchitis or bronchorrhœa he attempts to relieve the loaded bronchi of theirs, and hence he washes out the bladder from time to time with his double catheter or some other contrivance; but while not neglecting this part of his duty, is not his principal object to *alter* the character of the



mucous membrane, to raise a healthy action in it, to operate, in short, on the source of the vitiated secretion by the administration of buchu, uva ursi, pareira brava, copaiva, cubebs, turpentine, cantharides, sesquichloride of iron, citrate of potash, as Dr. Owen Rees recommended a few years ago, or by any of the other agents of a similar kind which seem best calculated to effect a radical cure? Supposing, however, that fascinated by the idea of bronchial peristalsis, the practitioner is pervaded by the cognate idea of cystic peristalsis too—there being as much foundation for the one peristalsis as for the other—how, in that case, would he deal with the cystirrhœa? Impressed with the notion that “expectorant remedies” are the “excitors of the bronchial peristalsis,” he looks into the most recent work on the *Materia Medica* for the excitors of the cystic peristalsis—the excystisant remedies; but not finding them there, though he has explored the “contents,” and peered into the index from A to Z till his eyes are strained, all he can do to solace himself under his disappointment is to abuse the General Medical Council for their long delay in bringing out the National Pharmacopœia, where the excystisants, or cystic excitors, are *sure* to have a place. Because, if for the cure of chronic bronchitis we are recommended to excite bronchial peristalsis, which is impossible, and to put our faith in expectorants *for that purpose*, surely by parity of *reasoning* we ought, in chronic cystitis, to excite cystic peristalsis, which is equally impossible, and to deal largely in the excystisants—that is, when we get them. From both kinds of remedies the chances of success are about equally balanced—the turn being rather in favour of the excystisants, inasmuch as the bladder *has* longitudinal muscular fibres to be operated on, whereas the bronchi have none. But, seriously speaking, is it necessary to make any further remarks on the futility of attempting to eradicate disease from a mucous membrane by any influence that can be exerted over its muscular exterior? In gonorrhœa, in blennorrhœa, leucorrhœa, and every other *rhœa*, is it against the flux, looked at by itself, that our treatment is directed? Certainly not. In the diseases which have just been named, and others of that class—apt as we often are to be misled into erroneous pathological views by names which give prominence to effects and ignore causes—in all of these diseases, I say, is not the treatment of every practical man directed not against the discharge, abstractly considered, but against the mucous membrane, of whose morbid condition the discharge is only the manifestation and the effect?

The teaching regarding the therapeutic means to be employed in diseases of the mucous membrane of the lungs, which I have inculcated ever since I began to lecture, has been based on the pathological principles now submitted; and I have reason to



believe that similar doctrines are promulgated by Dr. James Morton, my friend and former pupil, and now successor in the lectureship of *Materia Medica* in the Andersonian school of medicine. And I see no reason why the teaching should be changed. Not a few, I dare say, of the readers of the *Glasgow Medical Journal* have heard the following words, the reading of which may recall some old, but I trust not unpleasant associations; and the remarks—which, alas! have done duty for nearly a quarter of a century—now figure in print merely to establish what has just been advanced. Any old pupil whose eye may be caught by these pages, will remember that the quotation is from the “summary” of the action of the expectorants:—“There cannot be a doubt that great benefit in the treatment of chronic bronchitis results from literally clearing out the pipes, whereby the ingress of air is facilitated and dyspnœa relieved. It must be remembered, however, that the mere unloading of the bronchial tubes, the mere sweeping out of the flues, though it imparts a temporary alleviation from the horrors of dyspnœa, affords no guarantee that these tubes shall not be again blocked up, affords no guarantee that cough and dyspnœa shall never return to torment and annoy, and that, in order to convey substantial and permanent relief, we must adopt means to counteract the causes which produced the original supersecretion, and which causes, if unchecked, will again be at work to effect a repetition of the evil. Counter-irritation, in some one of its diversified forms, must be pressed into the service, the general health must be improved, the atonic ærian membrane must be invigorated, and a healthy action excited throughout the whole of the diseased locality. The means for effecting these objects were fully considered as we went along.”

In another part of this paper an attempt has been made to show, that as coughing is a necessary part of the act of expectoration and unquestionably a muscular effort, it is necessary that means be taken to improve the system generally, so that the muscular apparatus which effects the respiratory modification of coughing—participating in the general improvement—may be made efficient for the conducting of that essential precursor of expectoration. Hence it is that general hygienic measures, that tonics, stimulants, and other means of a similar description, are serviceable in invigorating and exciting the respiratory muscular structures that are concerned in coughing; and hence also, while not derogating from the high therapeutic position which these means occupy as operating on the vital powers as a whole, it is not improper to speak of them when employed in this special relation and for this special purpose, as excitants of the muscles of respiration—to speak of them, as I have ventured to style them—Pneumo-musculo-excitants. Nor would I wish the



reader to overlook the circumstance, that while in the giving of an exposition of a general plan of therapeutic operations, such as I am now attempting to give, it is necessary to describe the separate action which each class of means performs—assigning to each its allotted part, so to speak, in the performance of the cure—while it is necessary, I say, to proceed in that way in the *exposition*, we proceed in a very different way at the bedside of the patient, where all the required appliances of our art are blended in the aggregate which we call “the treatment,” in which the distinctiveness of individual agency disappears in the working out of an expected general result.

Now, keeping this steadily in view, we shall find that other means, in addition to those just mentioned—means already referred to incidentally—are not only of great efficiency in exciting the muscles concerned in the act of coughing, but that, along with others about to be noticed, they are likewise the best adapted to the accomplishment of the ultimate object which we should ever have in view in the treatment of chronic bronchitis—the restoration of the healthy state of the mucous membrane. It has already been stated, that the vapours of benzoin, of the balsams of tolu and peru, of turpentine, of vinegar, of diluted chlorine and iodine are of service, *when inhaled*, in stimulating the afferent fibres of the pneumogastric nerve, and thus to make the act of coughing more easy and efficient for expectoration; and I have now to add, what is known to every practitioner, that some of these substances, administered in the usual way—the compound tincture of benzoin, for example, the preparations of tolu and peru, and turpentine, *introduced into the blood from the stomach*—visit in their transit the mucous membrane of the lungs, stimulate it to healthy action, and thus conduce to the radical cure of chronic bronchitis. Of course, I do not expect to add anything to the information of my fellow practitioners; but I would remind them that Dr. Watson, in his valuable lectures on the Practice of Physic, administers a friendly rebuke to us all for “neglecting,” as we too often do, the compound tincture of benzoin, a medicine which his long and extensive experience has convinced him is of great value in the treatment of the chronic disease now under consideration. And further, in favour of turpentine, I would recall to their recollection that in detailing the advantages of Arcachon—a large inland bay about thirty-five miles to the south-west of Bordeaux—as a fitting climate for the phthisical, Dr. Corrigan referred to the circumstance of a great belt of pine forest extending for many miles around it, and that “live turpentine” is gathered from the trees, as *one* of the reasons why this place should be selected for such patients. “The whole air,” he says, “is perceptibly impregnated with the balsamic



odour of turpentine, and we know that the balsams and turpentine in vapour are remedial agents of much power in bronchial affections. This arises not merely from the presence of pine forests on a great scale, but from the gathering of turpentine or resin from the live tree, this trade and its products now constituting the main wealth of the district." The foetid gums, also, and ammoniac in particular, will be found very useful in the treatment of this disease. A solution, or emulsion rather, of gum-ammoniac in diluted nitric acid is a combination from which, in hospital practice and elsewhere, I have seen decidedly beneficial results. As this emulsion combines the quality of cheapness with the higher one of efficiency, I submit the following formula, chiefly for the consideration of those who are much occupied in dispensary and hospital practice. Two drachms of the gum, two drachms of the acid, and twelve ounces of water, are the constituents of this mixture, of which an ounce may be given in gruel, three times daily. The nitric acid has not only the property of holding the gum in suspension, but being a good tonic likewise, it invigorates the general system, as also the supersecreting mucous membrane; while the ammoniac, or its volatile oil rather, passing out from the blood along that surface, raises in it a healthy action, that is, alters it in the transit. Promoting the same end and in the same way, garlic, onion, leek, are all stimulating alterants of the same structure and may be administered in connection with diet, and are likely to be beneficial. To these might be added senega, lobelia, myrrh, copaiva, and who requires to be told that squill is the expectorant, *par excellence*? Now all of these, and others might be placed on the list, alter the aërian membrane from a state of disease to a state of health, and they do so by stimulating that surface. I suggest, therefore, that these agents should be called Stimulating broncho-muco-alterants.

Before finishing this article, I beg to submit a few general conclusions by way of summary:—First, That as in the early stage of acute bronchitis, the pulmonary mucous membrane is inflamed and dry and the bronchi consequently contain nothing to be expectorated, the remedies which are employed in the treatment of that form of the disease cannot with any propriety be called expectorants. Second, That as the principal indication of cure in acute bronchitis is to alter the condition of the mucous membrane, to make it natural and moist from being inflamed and dry, the agents which effect this change might be called Relaxing broncho-muco-alterants. They are, principally, inhalation of vapours, tartar emetic in one-twelfth or one-sixth of a grain doses, ipecacuan in one-quarter or one-half grain doses, henbane, hemlock, aconite, green hellebore, hydrocyanic acid, demulcents, alkalies, &c. Third, That as in chronic bronchitis the



system generally is often in an atonic state, and the mucous membrane of the lungs is always so, the indication of cure is to invigorate the general system by tonics, stimulants, and general hygienic measures, and particularly to alter the aërian membrane from a state of debility to a state of health by the administration of those medicines which are known to stimulate that surface, and that such agents might be called Stimulating broncho-muco-alterants. They are, principally, squill, leek, onion, garlic, benzoin, styrax, preparations of tolu and peru, turpentine, copaiva, the foetid gums, myrrh, senega, lobelia, sesquicarbonate of ammonia, &c. Fourth, That as coughing is necessary for the removal of excessive muco-purulent secretion and the consequent relief of dyspnœa, and is a muscular act performed by respiratory muscles, it is often necessary to excite these to healthy contractions, and that the means for that purpose, when employed in that special relation, might be called Pneumo-musculo-excitants: that these means are, chiefly, stimulants, especially the sesquicarbonate and aromatic spirit of ammonia, alcohol, as also tonics as a class, and more particularly, nux vomica, iron, cinchona, along with general hygienic measures, the use of embrocations, sponging and friction, and the inhalation of stimulating vapours, so as to excite the afferent branches of the pneumogastric nerve that are spread out upon the mucous membrane of the larynx.







