right way to use such an apparatus is for the patient to open the mouth wide, place the spray nozzle just within the lips, and then take several deep inspirations while the spray is still actively issuing forth; to enable him to do this it is necessary that the spray should issue for several seconds, and this can only be the case when the elastic reservoir is inserted in the pumping tube. An exceedingly useful mixture to place in such an apparatus is one composed of tinct. benzoin co. vinum ipecac. and a 5 per cent. solution of cocaine, in equal parts; used properly in spray this relieves the cough produced by all irritable conditions of the larynx such as acute and chronic laryngitis, even when tuberculous, and is very useful when nothing is to be seen and yet the patient complains of a tickling in the throat.

I have already drawn your attention to an important principle in the treatment of the useless form of cough in phthisis, namely, to avoid sudden changes of temperature in the air which is breathed or which comes in contact with the skin; a fire in the bedroom and a warm bed for the purpose need not be further alluded to. If, however, the cough, even in advanced cases of phthisis, be useful in clearing out a cavity or emptying tubes filled with muco-purulent secretion, such precautions need not be adopted, at any rate, so vigorously. In definite phthisis with a useful cough I have found nothing so efficacious as the following: Pot. iod., gr. viij; syr. tolu., ʒss; aq. ad ʒss, t.d.s.

In chronic and subacute bronchitis I have a little personal experience to offer you, which is that this is the condition *par excellence* in which smoking and excessive talking should be avoided; but, on the other hand, do not avoid or countermand the cold morning tub—during the night a good deal of secretion collects in the bronchi, and there is no better stimulant to help a cough to clear this out than that derived from the cold morning bath, personally I find it better than any drug. Of course, such a thing is only advisable for those who are accustomed to it; it would not do for those with weak heart or who are unaccustomed to it, and equally, of course, it will not do for bad acute bronchitis. If in such chronic cases cough is very troublesome I find the iodide prescription very useful and also the troch. glycer. et anisi of the Brompton Pharmacopoeia, which loosens the phlegm in a remarkable manner.

I am inclined to think that potassium iodide is much more useful for adults than for children in assisting cough. In the latter I find that belladonna pushed rather freely gives me better results than any other drug; by "pushed" I mean 5 or 6 minims for a child of 2 years, and that given four-hourly; such doses must be watched for dilatation of the pupil and for delirium.

Beyond these few—I fear very fragmentary hints—I have no special panacea for coughs to offer you unless it be that actual change of air—atmosphere—is a very excellent prescription for the cough of debility in those who can afford it.

COMMON CAUSES OF ERROR IN EXAMINATION OF THE CHEST.

By J. EDWARD SQUIRE, M.D.,

Physician, Mount Vernon Hospital for Consumption and Diseases of the Chest.

It is unfortunately true that even the youngest and most inexperienced amongst us may occasionally be mistaken. But, even mature experience does not preclude the possibility of error, especially in the solution of problems involving the accumulation of evidence only to be obtained by skilled observation and deductions from signs which are capable of various interpretations. There is, perhaps, no form of medical examination in which constant practice is more necessary in order to detect signs and experience to interpret them than the examination of the chest. This is little realized by the student who has been taught his physical signs from well-marked cases of disease, and it is sometimes lost sight of by the practitioner. Most of us who have been connected with a hospital for chest diseases have watched with amusement the "cocksureness" of the new resident or student, and waited for the "humble mindedness" which comes after a few weeks of special experience. But though we cannot hope entirely to avoid error, we may minimize the chance of mistakes by studying the more common causes of error. I propose to mention some of these under the following headings:—(1) incomplete examination, including want of method; and (2) faulty interpretation of signs, and I shall confine

myself entirely to such cases as have come under my own observation. I need not discuss the mistakes which arise from a routine treatment of symptoms without any attempt to investigate their cause, though this subject might be of value if we could speak to the prescribing chemist. We are justified here in excluding the possibility of carelessness or of ignorance.

In view of the short time at my disposal I shall aim at making my remarks suggestive rather than exhaustive. Let us, then, first consider

ERRORS ARISING FROM INCOMPLETE EXAMINATION.

Although not strictly within the limits defined by my title, I may remind you that it is a serious mistake to neglect altogether to examine the chest when there are conditions which suggest the possibility of mischief within the thorax. I do not, of course, propose that the chest should be examined in all cases which present themselves for treatment, for I know that in general practice this is impossible as well as undesirable. Where, however, there is any ground for suspecting disease of the heart or lungs, examination should not be deferred for the symptoms to develop. We all know, for example, how insidiously tuberculosis of the lung may commence, and how much depends upon early treatment and consequently upon early recognition of the disease. When the family history, general condition, or personal surroundings of a patient point to special predisposition to consumption, a precautionary periodical examination of the chest—say once in six months—is desirable, especially for the few years just before and after puberty.

More definitely within the scope of my subject come those cases in which a partial examination of the chest is made to verify the existence of some conditions suggested by the symptoms for which the patient seeks relief, which being found, no further investigation is pursued. As an example of this, I may instance the cases in which the existence of anaemia has been verified by hearing haemic murmurs in the neck or over the heart, but where no examination of the lungs has been made and commencing tuberculosis has thus escaped detection. I have met with several such cases, in some of which the consequent delay in commencing special treatment has been disastrous to the patient.

Another somewhat similar source of error occurs from neglecting to carry out the examination further as soon as any evidence of lung mischief has been found in one part. In this way pleurisy at one base has been discovered, and tuberculosis at the apex of the same or the opposite lung has been undetected; pneumonia has been correctly diagnosed and pericarditis or endocarditis overlooked; a hydatid cyst in the lower lobe of the lung has been unsuspected, whilst some dullness at the apex was discovered. So also bronchiectasis or tuberculosis may be overlooked when associated with chronic bronchitis or with fibroid disease of the lung.

A curious example of what obvious conditions may be missed by incomplete examination came under my notice a few years ago. A patient was sent to me because of commencing tuberculosis in one apex, and immediately the chest was fully uncovered it was evident that the heart's impulse was on the right side of the chest. Further investigation disclosed complete transposition of the viscera, unnoticed by a man whose skill in physical examination was sufficiently developed to enable him to detect slight changes in the apex of the lung. Examination without removal of the clothing will frequently lead to error. To listen through clothing cannot furnish exact results, and even to leave the clothing over the neighbouring parts whilst the part being examined is bared may cause mistakes. I have been asked to explain the significance of a creaking *râle* which disappeared completely on removing the patient's leather braces.

A not uncommon form of incomplete examination is that due to want of method. If you commence to examine the lung by putting your stethoscope to the chest and asking the patient to take a deep breath, you may at once obtain evidence of disease; but if the examination begins and ends with this you will obtain very incomplete information, and may miss much that is of importance. If on the other hand you develop the habit of systematic and methodical examination, the various stages of investigation—inspection, palpation, percussion, and auscultation—will follow each other as a matter of course in every case, and mistakes will be fewer. The stage which is perhaps most often neglected is that of inspection, yet there is much that is valuable which may be learned from this mode of investigation. I had, only a day or two ago, a very instructive instance of the value of

inspection. A patient was supposed to be suffering from early tuberculosis of the lung. Percussion over the upper part of the chest gave hyper-resonance over the left apex, and comparative deficiency of resonance above the right clavicle. The breathing was weak at the left apex, and the louder breath sounds on the right side suggested harshness in comparison. Slight consolidation in the right apex was thereupon suspected. Inspection, however, showed very marked diminution in the respiratory movements on the left side of the chest, especially in the lower part, which led to more careful examination, disclosing evidence of pleurisy at the left base. So too it is wise to listen to quiet breathing before asking the patient to breathe deeply, and also to get the patient to cough and then to draw a deep breath. Crepitations, otherwise unheard, may be brought out in this way, and *râles* may be altered or may disappear on coughing.

We may include amongst the incomplete examinations those cases in which an examination, having been once made, is not repeated, so that the course of the disease processes is not followed, and complications may develop without our knowledge. In many lung diseases and in acute diseases of the heart or pericardium it is most necessary to examine repeatedly so as to follow the progress of the morbid processes. The development of a fresh centre of disease in another lobe of the lung already attacked by tuberculosis materially modifies our view of the patient's chances of recovery. The following figures, taken from the medical reports of the Mount Vernon Consumption Hospital, will serve to illustrate this fact. Of rather more than 1,400 cases, 19 per cent. had only one lobe affected, and of these 93.65 per cent. left the hospital improved; 40 per cent. had mischief in two lobes, and 73.57 per cent. of these were improved; 26 per cent. had three lobes affected, and 58.15 per cent. of these left improved; the remaining 15 per cent. had mischief in four lobes, and only 46.37 per cent. of these were classed as improved when they left the hospital.

By repeated examination it may be possible to detect the early signs of danger in some new situation in time to counteract it—a matter of much importance to the patient. As an example of the danger of neglecting to repeat the examination of the chest in lung disease, I select the case of a nurse who had an attack of acute bronchitis, and who, after the acute attack had passed off, still continued to cough. No further examination of the chest was made, however, until she came to London some few weeks later, when I found softening tuberculous mischief in the lungs from which she died within a year.

Fluid may accumulate without our knowledge in the pleural cavity (for example, empyema in a child after an attack of pneumonia) if examination is not repeated after the original disease has been diagnosed.

Imperfect or incomplete examination is clearly a preventable source of error which should be avoided.

We come now to the

FAULTY INTERPRETATION OF SIGNS.

This is a more common and more excusable cause of error. Although errors of interpretation are of course sometimes the result of inexperience, all of us are liable to misinterpret the evidence obtained by physical examination. Nor is this in any way surprising to those with sufficient knowledge of the subject to appreciate the difficulties. In the first place we are confronted with the impossibility of fixing a standard which shall represent the healthy condition for all individuals, and thus in determining what in any case constitutes a divergence from health. We may have, and as a fact we do all carry in our minds, some idea of what constitute the physical signs of a healthy lung; but no two individuals are precisely alike, and signs which may indicate a healthy condition of the lungs in one person might constitute evidence of disease in another of different age, sex, build, and physical development. Not only so, but the signs heard over one part of the chest in health would indicate some divergence from health if heard over another part of the chest. We fall back on a comparison between corresponding parts of the two sides, but this, as we shall see, may not always remove our difficulty. One cause of occasional error is to be found in the difference not infrequently to be noted in healthy persons over the apices of the lungs when one side is compared with the other. It is essential, in order that we may be able to detect divergences from health, that we should be conversant with the physical signs obtained on examination of the healthy chest.

I have recently completed the examination of the chest in

a series of 100 healthy persons of both sexes, carefully noting the differences over the apex of the lung between the two sides as regards percussion note, breath sounds, vocal resonance, and vocal fremitus. The result, briefly summarized, is as follows: Some difference in the percussion note, generally a slight deficiency over some portion of the right apex, is noted in 45 per cent. of the cases; some slight difference in the intensity or character of the breath sounds is found in 27 per cent.; vocal resonance is louder on the right side in 77 per cent., and vocal fremitus more marked on that side in 79 per cent. of healthy persons. Although, theoretically, we should expect to find the increase in vocal resonance and in vocal fremitus to be directly associated in all cases, practically I find that in a small number of cases these do not go together.

Differences in percussion note, vocal resonance, and vocal fremitus I find to be more often noted in men, whilst differences in the breath sounds occur more frequently in women. The figures are:

	Males.	Females.
Percussion differences ...	50 per cent.	37.5 per cent.
Breath sounds " ...	23 " "	32.5 " "
Vocal resonance " ...	83 " "	70.0 " "
Vocal fremitus " ...	86 " "	77.5 " "

Time does not allow of my pursuing this interesting subject more fully on the present occasion, but it will be observed that some deficiency of resonance is to be detected on percussion over a portion of the apex of the right lung in about half the healthy chests examined, and that increased vocal resonance and fremitus on the right side are to be noted in the majority of individuals in health. I have known the "flatness" on percussion over the right apex, which is quite compatible with health, attributed to commencing consumption, and, on the other hand, signs due to consolidation put down to the physiological condition. We must bear in mind that, along with the louder breathing sometimes heard on the right side, the expiratory portion of the sound will probably be more clearly heard, but it will not in health equal or exceed the inspiratory sound in length. If with a slight deficiency of resonance, louder breath sounds, and increased vocal resonance and fremitus, there is a noticeable prolongation of the expiratory portion of the breath sound, the inference of disease is not only justifiable but almost convincing.

Another difficulty I have occasionally met with, also depending on the want of a definite normal standard, is somewhat curious. I have known careful observers rightly express the opinion that a patient has early tuberculosis of one lung, but locate the lesion on the wrong side. At first sight this seems almost impossible, but a moment's consideration will suggest the explanation. A sufficiently well-marked difference between the two sides is noted, which is too great to be physiological; but without some standard to guide the observer it is difficult to say which is the normal for that individual, all that is certain is that if one lung is normal the other cannot be so. It is true that with more care in noting the various details of the breath sounds, etc., it should generally be possible to avoid such an error, but I have known competent observers differ as to which was the affected lung, whilst agreeing as to the presence of disease. Another cause of mistake as to the side affected in tuberculosis is the presence of emphysema around a patch of consolidation, making the percussion note and breath sounds seem clearer on the affected side than on the other. Whilst on the difficulties met with in cases of tuberculosis of the lung, I may refer to another not unusual error which would be avoided if the general condition of the patient were duly considered, namely, mistaking signs of a scar, or of obsolescent tuberculosis for active disease. I have also known compensatory (puerile) breathing mistaken for tubular breathing, with consequent misapprehension as to the condition of the lung. This mistake could hardly be misleading if the relation between the length of the inspiratory and the expiratory portions of the breath sound were noted, or if the impression produced by the quality and pitch of the breath sound were further tested by the absence or presence of pectoriloquy. This error exemplifies a fault which is not unknown among the less expert observers, namely, that of noting part only of the characteristics of the breath sounds—for example, pitch, intensity, etc.—and omitting to note the quality of the sound or the relation which the expiratory sound bears to the inspiratory in regard both to intensity and duration.

The signs of a cavity in the lung are sometimes misleading. It is not always easy to detect a cavity of moderate size, and it is often difficult to locate even a large cavity. At a meeting of the Harveian Society some years ago I showed a youth with signs of a bronchiectatic cavity which

seemed to be quite near the surface, and the situation and extent of which appeared to be clearly defined. Yet attempts to drain this cavity were made at several different hospitals without success, and when I saw the patient again twelve months later he had numerous scars on his back, but no operator had found the cavity.

The explanation of the above difficulties is that, though we may rightly attribute certain physical signs to the presence of an air-containing space of comparatively large size, we cannot always say that it is an excavation of the lung tissue. The signs may be produced in an undilated bronchial tube, and be conducted to the ear by solid tissue between the tube and the surface of the lung. So, too, in the localization of cavities the sounds produced in the cavity will be conducted in the direction of the adjacent consolidation, not necessarily by the shortest route to the surface. Thus the signs of a cavity may be best heard not immediately over the nearest portion of the chest wall, between which place and the cavity there may be air-containing lung, but at some more distant part of the chest where consolidated lung reaches the surface from the neighbourhood of the vomica.

Let us now pass to another error in a different kind of disease—the failure to detect the presence of fluid in the pleural sac, or the mistaken diagnosis of effusion. Although the classical description of the signs which indicate the presence of fluid in the pleural sac—dullness on percussion, absence of breath sounds, absence of vocal resonance and fremitus, and displacement of organs—furnishes such a distinct chain of evidence that mistake seems impossible, the definite detection of fluid is, in many cases, a matter of great difficulty. Breath sounds may be clearly though not loudly heard when there is a considerable quantity of effusion, and if the pleura be thickened vocal resonance and fremitus may be present, and the heart sounds be conducted over the dull area. The displacement of organs, even with a large effusion, may be prevented by adhesions, or counteracted by the traction of a contracted lung—as when pleural effusion occurs with a contracted tuberculous lung above, and the heart has been displaced by the older lesion. In young children the signs of fluid are often indefinite or misleading. I have been asked to see cases said to be pneumonia with delayed resolution, in which I have found the signs supposed to indicate solid lung to depend upon fluid in the pleural cavity, and to disappear on aspiration. The mistake may perhaps sometimes have occurred from insufficient examination, but in other cases it has certainly been due to faulty interpretation of the physical signs noted. It is by no means easy in some cases to determine the presence of pleural effusion, apart from those cases in which the fluid is pent up between two lobes, or otherwise localized by adhesions.

As a further illustration of a class of cases where faulty interpretation of signs may occur we may meet occasionally with cases in which fluid is found in the pleural cavity secondary to some morbid condition below the diaphragm, or where the fluid is not due to pleural inflammation. Here the physical signs may be rightly referred to fluid in the pleural cavity, but the true nature of the disease is not diagnosed. I have known the pleural sac to contain fluid poured into it by the bursting of a hydatid cyst in the lung, and a case where a pleural effusion was supposed to be purulent, but was found to consist of clear serum, the symptoms indicative of the presence of pus being due to a subphrenic abscess from a perforated gastric ulcer.

Many of us have experienced the difficulty in distinguishing in children between a broncho-pneumonia and disseminated pulmonary tuberculosis, or in adults between an apex-pneumonia and tuberculosis. This is, however, not a matter of mistaking the physical signs, for tuberculosis produces a broncho-pneumonia in children or a pneumonia in the adult. The physical condition of the lung is the same whether the exciting cause be the tubercle bacillus or the pneumococcus; it is by the course and development of the lesion that the effects of the different causes may be distinguished.

With regard to the heart, as with the lungs, errors may arise from incomplete examination or from faulty interpretation of physical signs. Enlargement of the heart is sometimes inferred from the apex beat being lower or further to the left than its normal position. The heart may, however, in such cases be of normal size, but displaced. So, too, an apparent increase in the area of cardiac dullness may indicate, not an enlarged heart, but a retracted lung. In palpation pericardial friction may be mistaken for a thrill, or pleuro-pericardial friction may be confused with a pericardial rub.

In auscultation an "accidental," "functional," or "haemic" murmur may be taken for an organic murmur, and vice versa. The first and second sounds of the heart may be mistaken one for the other, and similarly an obstructive murmur may be supposed to indicate regurgitation.

Sometimes a murmur produced outside the heart is mistaken for one originated at one of the cardiac orifices. Thus pericardial friction or a cardio-respiratory murmur may be so misinterpreted. The cardio-respiratory murmur is occasionally very misleading. This is a "whiffing" or blowing sound produced by the impulse of the heart, or the pulsation of one of the large arteries, forcing air out of an adjacent portion of the lung. It is usually heard during expiration and gets its rhythm from the beating of the heart, being thus cardio-systolic in point of time; it may disappear when the patient holds his breath. I have known such a murmur, produced in the tongue of lung between the apex of the heart and the chest wall, mistaken for a mitral regurgitant murmur, and when heard over the second right intercostal space aortic obstruction has been erroneously diagnosed.

I described this murmur at some length in the *BRITISH MEDICAL JOURNAL* of December 10th, 1898, and need not refer more fully to it here. This murmur has, in several instances which I have met with, caused difficulty in cases examined for life assurance.

I trust I have not been wearisome with this tale of pitfalls which may cause trouble to the investigator of chest diseases. The mere enumeration of such difficulties in the examination of the chest as have caused errors within the knowledge of a single observer is sufficient to show that the examination of the chest is no simple matter. The possession of a stethoscope does not in itself indicate an adequate equipment for the investigation of chest diseases. The detection of the various physical signs requires careful training and constant practice, their interpretation demands special knowledge.

The man who is conscious of the most mistakes is not necessarily the one who has made the most, but I am not so sanguine as to imagine that those errors which I have recognized, and which have prompted this paper, are either so numerous or so serious as those which I may unconsciously have committed.

TUBERCULOSIS IN THE SOUTH OF IRELAND.*

By J. DARLEY WYNNE, M.B., M.R.C.S., D.P.H.,

Honorary Secretary of the Waterford Division of the South-Eastern of Ireland Branch.

OWING chiefly to improved methods of modern sanitation and to the increased attention which is now given to education in hygiene, and especially to the value and importance of fresh air, the mortality from tuberculous diseases in England, Wales, and Scotland has been greatly reduced in recent years.

Excessive Mortality from Phthisis.

Unfortunately, across the Irish Channel the same happy condition of things cannot be said to exist, as I will now endeavour to show by an examination of figures taken from the annual reports of the Registrar-General of Ireland for the years 1901 and 1902, and from an investigation of the death returns of the Registrar of the Clonmel Urban District.

In the Registrar-General's report for 1902 (page 16) there is a most interesting and instructive diagram, which shows at a glance how, while in England and Scotland the death-rate for all forms of tuberculous disease has fallen to a remarkable degree in the 39 years from 1864 to 1902, yet in Ireland it has actually increased.

In Scotland in 1864 the tuberculosis death-rate was 3.6 per 1,000, rose to 3.9 in 1870 and 1871, and then gradually fell to 2.3 in 1900. In England the death-rate from these diseases was 3.3 in 1864, 3.4 in 1866, and has since gradually fallen to 1.9 in 1900, and in 1902 the phthisis death-rate in London was as low as 1.64 per 1,000. But in Ireland the rate, which was only 2.4 in 1864, has since gradually risen to a maximum of 2.9 in 1900,¹ and was as high as 2.7 in 1902. While this was the death-rate from tuberculous diseases for the whole country, in those urban districts having a population of 10,000 and upwards, the rate was 4.29 per 1,000 in 1901, and 4.1 in 1902. The highest death-rate from tuberculosis in these towns was in Clonmel (population of urban district, 11,023), where it was 6.5 per 1,000 in 1901.

* Read at a meeting of the South Eastern of Ireland branch of the British Medical Association.