alone being considered and the percentage of the population under £15 and over £20 being given. Even without considering rateable value, it appears that the exposed streets have actually nearly four times the phthisis death-rate of the sheltered, and when a rough correction is applied for rateable value the ratio becomes rather greater than four to one. Without insisting for a moment on these precise figures, it seems fair to conclude on the whole that the influence of rainy wind is considerably greater than those of soil and poverty. This conclusion is important, because it makes possible an enquiry into the effects of rainy winds in localities where the part played by soil and poverty cannot be assessed.

6. The Influence of Rainy Wind Direct.

Lastly, it has been asserted, on no grounds of evidence whatever, that the influence of rainy winds on phthisis is indirect only, producing its effect on the people through the medium of the houses, either by compelling the closure of doors and windows or by driving wet into the walls. It might have occurred to those who put forward these theories that doors and windows are not all on the westerly sides of houses, and that houses standing in valleys which receive the drainage of surrounding hills are at least as likely to be damp as those on a steep hill slope exposed to wind but with rapid drainage for rain. But the present material affords more solid ground for rejecting these surmises.

In Exeter Mr. Wreford, the Sanitary Inspector, assures me that the phthisis distribution cannot be explained by wet driven into walls, because the newer houses have double walls and 75 per cent. at least of the older house have battened walls, which amount to the same thing.

Further, the streets which suffer most from phthisis are those along which the wind blows—that is, just those in which it does not drive directly against doors, windows, and walls; and again, since the streets which suffer most are those whose roadways are exposed, it seems natural to conclude that the rainy wind exerts its influence on the people themselves as they pass along these roadways.

The recognition of a direct influence of rainy wind explains its injurious effect observed in cases of phthisis exposed to it, and the unsatisfactory results sometimes seen from "change of air" to a situation which is rainy and windy.

In conclusion, my best thanks are due to Mr. Wreford, Sanitary Inspector of Exeter, for most kindly placing at my disposal the invaluable assistance of his long and intimate knowledge of all parts of the city, especially for corroborating my classification of the streets into sheltered and exposed as regards the winds.

RESULTS OF FOUR YEARS' SANATORIUM WORK IN THE TREATMENT OF PHTHISIS.

BY

ROWLAND THURNAM, AND CHARLES E. WHEELER,

M.D.,

M.D.,

Nordrach-upon-Mendip.

THE Sanatorium of Nordrach-upon-Mendip has now been open for five years, and a sufficiently large number of cases has come under observation to give a value to the statistics of results.

Only the first four years' cases have been taken into consideration, for it is only when a case has been tested by the lapse of some time that any confidence can be felt in the permanence of the benefit obtained from treatment, and of the cases of the first four years, only those have been retained for purposes of argument concerning whom definite news was forthcoming in the summer of 1904.

As far as possible all cases have been followed up, and the figures that follow have been based upon the replies that were made to our inquiries. The total number of cases available for use in this paper is 289. They may be divided into three main classes:

A. Severe (disease affecting either the whole of one lung or considerable areas in both, often complicated with disease of the larynx).

B. Moderately severe (disease affecting not more than one half of one lung, with or without slight affection of the other—laryngeal diseases occurring in this class also fairly frequently).

C. Slight (disease confined to one lobe of one lung).

CLASS A.—SEVERE.

This class includes 183 cases.

(a) Of these 56 died either in the Sanatorium or at home within

twelve months of commencing treatment. Percentage, 30.6. As no effort is made in this Sanatorium to select mild cases, this class includes a number of patients who come as a last resource, often nearly moribund.

(b) Twenty-three patients died within two years of the time of commencing treatment here. Percentage, 12.7. In these cases treatment may fairly be said to have prolonged life, but nothing in the nature of even a partial cure was obtained.

(c) Thirty patients have been followed for two years, but we have no news of them later. We know only that they were alive more than two years after beginning treatment. Some are no doubt dead, and the others ought to fall into the divisions that follow, but in the absence of exact knowledge it seems better to form a special class for them. Percentage (alive after 2 years), 16.3.

(d) Thirty-nine patients report themselves in fair health in 1904. They are not able to undertake the work of people that have never broken down, but are all able to enjoy life and do a certain amount of work, but need to exercise care in living. Percentage (in fair health), 21.3.

(e) Thirty-five patients are in enjoyment of normal health, working as hard as ever they did, and able to do all that the normal healthy man can do. Percentage (cured), 19.1.

CLASS B.—MODERATELY SEVERE.

This class includes 84 cases.

(a) Corresponding to similar subdivision of Class A, includes 2 cases. Percentage (died within twelve months), 2.3.

(b) Includes 3 cases. Percentage (died within two years), 3.5.

(c) Includes 19 cases. Percentage (alive two years after), 22.6.

(d) Includes 11 cases. Percentage (in fair health), 13.09.

(e) Includes 49 cases. Percentage (cured), 58.3.

CLASS C.—SLIGHT.

Includes 22 cases.

There are no cases in subdivisions a and b.

(c) Includes 1 case. Percentage (alive two years after), 4.5.

(d) Includes 1 case. Percentage (in fair health), 4.5.

(e) Includes 20 cases. Percentage (cured), 90.9.

Taking all the classes together, the percentages are as follows: Total, 289 cases.

Subdivision (a) 58 cases. Percentage (died within twelve months), 20.06.

Subdivision (b) 26 cases. Percentage (died within two years), 8.9.

Subdivision (c) 50 cases. Percentage (alive two years after), 17.3.

Subdivision (d) 51 cases. Percentage (in fair health), 17.6.

Subdivision (e) 104 cases. Percentage (cured), 35.9.

The classification according to severity sufficiently emphasizes the desirability of commencing treatment early; but if even of severe cases 19.1 per cent. can be wholly cured and another 21.3 restored to a very fair measure of health—over 40 per cent., taking both classes together—then there can be hardly any cases of phthisis wherein something may not be hoped for from sanatorium treatment.

FURTHER REPORT ON THE TREATMENT OF PHTHISIS BY IODOFORM INFUSION.

By THOMAS W. DEWAR, M.D., F.R.C.P.,
Dublaine.

IN the BRITISH MEDICAL JOURNAL for November 21st, 1903, I published a short preliminary report on the treatment of advanced pulmonary tuberculosis by the intravenous injection of iodoform, devoting myself chiefly to a description of the method. This involves at a later date either an admission that the hopes then expressed have not been fulfilled or the submitting of more convincing evidence to support the thesis then maintained. To establish the bona fides of my statements as far as possible I have had control examinations of the sputa made at the R.C.P. laboratory. In making the request I have intimated that the patients had been recipients of the iodoform infusion. At the beginning or end of some of the cases the name of a physician is placed in brackets. If at the beginning it means that they saw the case then, if at end, after treatment. I have asked their permission to introduce their names as evidence that the physical conditions were as stated, and I take this opportunity of thanking them for the courtesy. But they must not necessarily be understood as either approving the treatment or endorsing the moderate claims I have put forward for it. Until the lapse of time has confirmed the stability of the results and a larger number of cases have responded to the uniform treatment it is premature to ask them to commit themselves further. This being a purely clinical paper only a brief summary of lung symptoms is given. Other notes and observations are withheld.

DESCRIPTION OF TREATMENT.

Modification of Solution.

Since publishing my first paper I have modified the solution by adding 40 per cent. of liquid paraffin to it. Liquid paraffin has a sp. gr. 0.880, is perfectly soluble in ether, and the resulting solution is blander and less irritating to the veins. It further makes it possible to use much smaller vessels, in fact the limit is only defined by the size of the needles and the operator's dexterity. (It may be desirable to state that liquid paraffin is not paraffin oil.) Before using it I generally filter an ounce or so through cotton-wool. It is colourless, odourless, tasteless, and in itself dissolves iodoform to a small extent. I have occasionally used the iodoform in liquid paraffin alone in the proportion of $\frac{1}{2}$ gr. to 10 minims. This gives a preparation, part solution, part suspension, which is perfectly workable through fine needles—for example, Schimmel—and may prove of service in tuberculous joints, or hypodermically in tubercle of the skin and glands and peritoneum. It is painless on injection, and is prepared by crushing the iodoform in the liquid paraffin with a probe in a conical minim glass.

Messrs. Burroughs Wellcome and Co. have made for me half-grain tabloids of iodoform and a nonactinic all-glass syringe. It is essential to use an "all-glass" syringe. Ether destroys and shrivels the plunger of an ordinary piston, and very soon small pieces of it separate. These introduced to the fine lung capillaries would certainly give trouble. One of the tabloids is placed in the syringe, crushed with the piston, the ether drawn in and shaken till the powder is dissolved. Thereafter a few minims of liquid paraffin may be drawn up and the whole well shaken. To facilitate introduction, avoid haste, and prevent any escape, the point of the needle is sealed by dipping it in hazeline cream. When working with the basilic veins the handkerchief tourniquet is placed immediately above the elbow, when with the forearm veins about its middle, and when with the veins on the knuckles or back of the hand at the wrist. The radial vein and the skin over it are thick and more difficult to puncture and this is increased by its mobility. The fault of mobility for injection purposes applies to the ulnar also, but both are very serviceable. Prominence and tension of veins is assisted by giving the patient something to grip firmly in the hand. It is desirable when possible to inject in daylight, it is so much easier. The veins are generally fullest after 3 p.m. If these conditions are impracticable they may be temporarily distended by placing the forearm in hot water, but if this is done the solution of iodoform in ether alone must not be used. With the 40 per cent. of liquid paraffin added, however, it is perfectly safe. Enter the needle vertically and try to pin the top of the curve of the vessel with the point of the needle, and then pushing it gently on and bringing it into line with the calibre of the tube insert it half way. The sensation of going into a space is felt at once, and can even be seen by an onlooker. The patients usually know when it is right.

CASE I (Dr. Alex. Bruce; Dr. Craufurd Dunlop).

M., aged 40. Patient had dorsal myelitis at 37. Physical signs of consolidation and breaking down in upper lobe right lung with signs of cavity at apex. Friction and impaired percussion over left apex and under clavicle. Expectoration purulent, copious, showed large numbers of tubercle bacilli (R.C.P. Lab.). Temperature chart has already appeared in the BRITISH MEDICAL JOURNAL. During first five months his injections did not quite average one every second day. He was under observation about nine months and left with lungs quite healed, only an occasional expectoration in which tubercle was found with difficulty. A few months later, even this disappeared. (Dr. Alex. Bruce, Dr. Craufurd Dunlop.) He went to the South of France and was examined by Drs. SiorDET and S. M. Rendall. Six months later he died of acute ascending myelitis. I never saw him after he left Dunblane, but Dr. S. M. Rendall wrote to me in reply to my request for a statement which I might publish: "I had the opportunity of seeing him twice in consultation with Dr. SiorDET soon after his arrival and just before he left Mentone. On both occasions I considered that the lung disease was in complete abeyance, there was not a crepitation or a rale to be heard anywhere." Dr. Alex. Bruce, who saw him in Edinburgh a few days before his death, also assures me that he died of myelitis and his lungs had remained sound.

CASE II.

F., 18. Probable tuberculous history. Delicate childhood, winter coughs, never had a healthy appetite, liable to attacks of abdominal pain not relieved by laxatives; weight, 9 st. The temperature chart has appeared in the BRITISH MEDICAL JOURNAL. It had touched 103° F. Pulse—morning 95, evening 128; respirations—morning 24, evening 32; night sweats, constant cough, scanty expectoration, consisting of little hard lumps which contained numbers of tubercle bacilli (R.C.P. Lab.). Physical signs of great consolidation over right upper lobe and a few crepitations. Absence of breath sounds over lower lobe in front. Anteriorly on left side, impaired percussion, breathing cogwheel

VR and VF+. At the base post on right side were a few small crepitations. She also had several attacks of laryngeal pain and aphonia. Laryngoscopically nothing but congestion was observed. With tubercle active in the lungs, laryngitis and aphonia, and persistent abdominal pain, the prognosis was grave. She was under treatment eight months, receiving 151 injections. The laryngeal symptoms were treated by subcutaneous injections of CHI₃ in ether on either side the thyroid cartilage and endolaryngeal injections of the same solution through the cricothyroid membrane. When she left the lungs were dry and the disease quiescent—weight, 9 st. 7 lb. She has been at work about a year and kept well; no tubercle bacilli (R.C.P. Lab.). (Drs. E. S. Jackson and B. G. Morison.)

CASE III (Sir Thos. Fraser).

F., aged 20. Tuberculous history. Illness dates from an attack of scarlet fever seven years before. Weight 9 st. Neither pulse nor temperature ever rose above 100. Sputum mucopurulent, contained large numbers of tubercle bacilli (R.C.P. Lab.). Right apex, anterior and posterior, impaired percussion and fine crepitations. Upper lobe of left lung and upper portion of lower lobe of left lung exhibited the physical signs of consolidation and breaking down. There were also friction rubs as low as the costal margin, anterior. Posteriorly, signs of consolidation, and breaking down from apex to angle of scapula; below that jerky breathing. This patient had not fewer than 250 injections. Sixteen months ago she climbed to the top of Dumyat, nearly 1,500 ft. Tubercle bacilli a very few (R.C.P. Lab.). Weight 10 st. (Sir Thos. Fraser.)

CASE IV (L. J. M. Deas, Captain, I.M.S.; Dr. J. A. Taylor).

M., aged 21. Very pronounced tuberculous history. Sputum, large numbers of tubercle bacilli (R.C.P. Lab.). Right upper lobe, physical signs of consolidation anterior and posterior, with crepitations anterior, and signs of small cavity over second interspace anterior. Left lower lobe, crepitations and consolidation anteriorly, consolidation alone posteriorly. Ischio-rectal abscess. Height, 5 ft. 11 in.; weight, 9 st.; tall, cadaverous, and slightly cyanosed at tip of nose, lips, and finger-tips. Temperature 103° (it rose on several occasions to 105°); pulse—morning 80-92, evening 92-108; respirations—morning 24, evening 28. He was x rayed, and Dr. Philp reports: "The screen confirmed your diagnosis completely, but showed a more extended area of dullness on the left side." Eleven weeks later the screen only showed a faint shadow at the right apex; his temperature was normal in three months. The ischio-rectal abscess is healed. His weight is 11 st. 4 lb. He had 150 injections at least of the CHI₃ in ether + 40 per cent. liquid paraffin. He has now very little expectoration, but tubercle can still be found in it. Posteriorly, there is no evidence of disease anywhere. Anteriorly, the percussion is still impaired over the upper lobe, and cavernous breathing is found over the inner end of the second interspace. This upper lobe is now expanding well. The left side is normal. (Professor Arthur Gamgee.)

Cases v, vi, and vii have many features in common. The earliest symptom in each was pleurisy, then slight consolidation, comparatively rapid recovery, and return to work; early relapse, more prolonged illness, more extensive infiltration and breaking down, extension of pleurisy and more restricted chest action, great flattening of thorax; obvious loss of lung substance, although distinct signs of a cavity exist only in No. 7; large numbers of tubercle bacilli in all (R.C.P. Lab.); digestion good in v and vi, but ruined in vii by previous efforts at overfeeding. All had constitutional disturbance, although the temperatures did not rise higher than 101° to 102°; all were incapacitated for work. On screening, the action of the diaphragm is very slight in v and vi, and in vii is quite lost.

CASE V (Dr. J. E. Moorhouse).

M., aged 21, height 5 ft. 7½ in., weight 9 st. 7 lb.; social condition, penury. Probable tuberculous history; illness began four years ago with hæmorrhage and pleurisy; principal lesion on left side, but both affected. He returned to work after four months' treatment, and has continued so without any relapse, and his weight has risen from 9 st. 7 lb. to 10 st. 2 lb.; his temperature is normal; cough and expectoration very slight, but there are still a good many bacilli in the sputum. The treatment has been continued two or three times a week while he has been at work. It is now a year since he resumed work, and he works seventy hours per week. Under more favourable conditions I feel sure he would have done still better.

CASE VI (Professor Wyllie).

M., aged 40; social condition good; bad tuberculous history in family; illness began six years ago with pleurisy, from which he recovered. He relapsed very seriously four years ago; both lungs involved. He has now been at work for two years and for the past eighteen months has travelled regularly 70 miles a day, and I do not think in that time he has had more than two weeks holiday. He still coughs in the morning, and bacilli are still present. As a precautionary measure he generally gets an injection on Saturdays and Sundays. Four years ago little hope was entertained of his recovery.

CASE VII.

M., aged 25, height 5 ft. 4½ in., weight 8 st. 8 lb.; social condition, penury. Illness began three years ago with pleurisy; both sides were affected, but the principal lesion, was on the right side. After six

months' treatment he was compelled to resume work, and has continued so uninterruptedly for nine months. With a history of pleurisy on both sides, a cavity at the right apex, and a bilobed bilateral infiltration it is rather remarkable that he can work at all. Despite the continuance of the treatment, as in Cases v and vi, his lung condition has not improved, although up to the present I do not think he has gone back. His weight increased 6 lb. before resuming work, but is back now to what it was. During the months of September and October he left home at 8.10 a.m., returning at 11.45 p.m., so the conditions under which he had to be treated could not possibly have been worse. He averages from 60 to 70 hours a week, and travels daily ten miles to work.

CASE VIII.

M., aged 20, social condition good, no tuberculous history, delicate as a child, said to have had atelectasis pulmonum; evidence of rickets in thorax; about six years ago had what seems to have been an abscess in the chest, and I suspect it is in the post-mediastinum, has involved the greater part of both lobes of the left lung, and empties through a big bronchus. He cannot lean back in a chair, and only sleeps semi-prone on his right side. The right lung is perfectly healthy; the left apex and base, both anterior and posterior, are also healthy, but elsewhere is absolutely dull, all round back and front and under axilla. This dullness extends across to the right side, and the heart-beat is felt near the right axillary border in the fourth and fifth interspaces. He used to expectorate a pint of sanious fetid pus in twenty-four hours, and had occasional rigors and haemorrhage; enormous numbers of tubercle bacilli and cocci. He has been under treatment three winters. He now expectorates 9 oz. It is no longer fetid, and few organisms besides the tubercle are found, but these still exist in considerable numbers. The area of absolute dullness is not so extensive, and faint respiratory sounds are returning at its periphery. The apex beat is coming nearer the right mammary line. Had the condition not been established for three years before I saw him he might have been assisted by surgery, but the permanent displacement of his heart, embarrassment of breathing, and the danger of administering an anaesthetic, contraindicated this. He would probably have died on the table or soon after. He takes the ethereal solution in liquid paraffin easily, but five minims of the pure ethereal solution occasions breathlessness for hours. His utmost possible is a quiet uneventful life; he can walk several miles, his appetite is good, and he has no temperature. (Professor Arthur Gamgee.)

CASE IX (Dr. Livingston-London).

M., aged 28. Height 6 ft. 2 in., weight 9 st.; social condition good; very pronounced tuberculous history; duration of illness before treatment six years. So soon as it was detected sanatorium treatment in Switzerland and at home was carried out with guaiacol, cod-liver oil, etc. Steady advance occurred in spite of every effort. There were cavities in both upper lobes—larger in the right—involvement in both lower lobes, bilateral pleurisy, very restricted action, and great flattening of chest. Patient could only sleep on his back. He had slight fever, considerable cough and expectoration, large numbers of tubercle bacilli. Sixteen months ago he had an exacerbation; temperature rose to 103.6; pulse 132; respirations 32; heavy night sweats; great increase of expectoration; clay stools; bilious vomiting, nausea, and loathing of food; in fact his whole appearance suggested the acute symptoms which so often precede the final dissolution. With many misgivings and very little hope for any response the treatment was begun. The temperature began to fall by fractions of a degree, and after several months regained what appeared to be his normal; that is, it rises to 99 or 99.2 either in the afternoon or evening. He is now the subject of hypertrophic pulmonary osteoarthritis, and every now and again expectorates calcareous particles. The expectoration has markedly decreased. He can now sleep on his right side, his appetite is good, and, while he can never hope to work, he gets about wonderfully. Great cold or a little wind at once embarrasses his breathing. The crack-pot sound can still be elicited over the right cavity, but not over the left; both have shrunk very much. He has had a very large number of injections, which, even with the addition of liquid paraffin, occasion breathlessness for some hours, and consequently cannot be given oftener than two or three times a week.

It is almost unnecessary to add that Cases vi, vii, viii, and ix all exhibit the clubbing of finger tips and cyanosed extremities so common in chronic phthisis.

CONCLUSION.

To criticize ones own results with something of impartiality is not easy. It is particularly difficult to be exact and not mislead in a disease so protean as phthisis, or to deduce much from such a small number of cases, yet some attempt is necessary at this stage. Cases i to v I would bracket together as "arrested." Their condition has been changed from what (in the opinion of others as well as my own) was a state of danger to one of comparative safety. They have practically lost their coughs, and in the occasional sputa only a very few tubercle bacilli can be found. In Cases i and ii they have quite disappeared. However, I attach no special importance to this. It might only mean that at the time no tuberculous focus was breaking down, and probably an animal inoculation would have disclosed tubercle. In Case iii I once failed to find any, but the R.C.P. Lab. found a very few afterwards. These cases have been under no restraint. The diet and general

hygiene has been that most suited to each particular one. It is hardly credible that five consecutive patients should attain this measure of recovery by chance in the course of one general practice. If so, it is a remarkable coincidence. So far as I know, the climate of Dunblane has no special reputation in phthisis. I have known several cases leaving it in search of a better. The one factor common to all has been the infusion of iodoform, and to this I attribute their immediate recoveries. In Cases vi and vii I would say it has "retarded" the advance. They are examples of what are euphuistically described as "economic cures." Case viii is very exceptional and rare—at least in general practice, and Case ix has been so shattered that passive existence is his highest possible. While the continued efforts of a physician to save a patient generally have a beneficial effect on the patient's mental condition, they unfortunately do not always influence for good the actual disease, and while admitting that patients' statements as to their feelings of betterness are not very reliable clinically, especially in phthisis, we cannot exclude such evidence altogether. Both viii and ix believe that they have received benefit. The improvements observed are noted in their respective reports, and I must leave the open minded to decide. As time goes on there will probably be some readjusting in these classes, but however they develop, if I can keep in touch with them the issues will be admitted. If Cases vi to ix have not responded so well as i to v, their duration must be remembered; also obliterated capillaries, much interstitial change and thick-walled cavities offer physical obstructions to the free circulation of the fluid. Besides, it is a clinical experience that iodoform is not so potent in caseous as in recent tubercle. This is to be regretted, for patients who have struggled hard unaided for five or six years, by that very opposition, declare that they would have done well could we at the beginning have brought them efficient assistance. As there is always a relationship between the duration of an illness and the period required for its recovery, such cases may do so yet if the physician neither admits defeat nor recognizes trouble. The contention in my first paper was that "the continuous successful injection of an ethereal solution of iodoform was followed by improvement, that it was innocuous in moderate doses and powerful to arrest pulmonary tuberculosis." I trust from the rather hopeless series of cases enumerated it will be conceded that I have gone some way to establish this.

THE TREATMENT OF HAEMOPTYSIS.*

By C. H. CATTLE, M.D. LOND., M.R.C.P.,

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As in the case of other symptoms, so in haemoptysis, the golden rule is if possible to remove the cause. Tuberculosis of the lungs is the most common cause of haemoptysis, and this we know we are often unable to remove; but unless we constantly bear in mind the various other causes of this symptom, we may treat the patient wrongly and overlook something obvious. The following case illustrates some of these difficulties. A man came to me at the hospital about a year ago with a history of occasional spitting of blood in considerable quantity for the last ten years. He was 48 years of age, temperate. He had had no other illness except operation for nasal polypi as a young man. At one time for his present trouble he had been dosed *ad nauseam* with creosote capsules, and had been told by a doctor he was consumptive. I could not find any morbid physical signs in the lungs, and it would be most unusual for consumption to exist for so long without producing signs. He had a slight cough, and expectorated small muco-purulent masses, slightly tinged with blood. The sputum did not contain tubercle bacilli. The left nostril contained polypi, and the mucous membrane over the middle and inferior turbinated bodies was much thickened. There had been no epistaxis, but I concluded the source of the bleeding was a vascular point in the nasopharynx. The blood probably trickled down the posterior pharyngeal wall, and was then expectorated with a slight coughing effort. The attacks were always sharp and short, ceasing as soon as the patient rested from exertion.

In all cases of haemoptysis of doubtful origin the accessible cavities should be examined—the nose, pharynx, larynx, and mouth; even the neglect to notice bleeding gums has led to

* Read before the Nottingham Medico-Chirurgical Society.