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Contributors

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FURTHER OBSERVATIONS

ON

THE USE OF OZONIZED OXYGEN

IN THE

TREATMENT OF PHTHISIS.

BY

ARTHUR RANSOME, M.D., F.R.S., &c.

Honorary Physician to the Hospital for Consumption and Diseases of the Throat.

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JOHN HEYWOOD,
DEANSGATE AND RIDGEFIELD, MANCHESTER;
1, PATERNOSTER BUILDINGS,
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FURTHER OBSERVATIONS ON THE USE OF OZONIZED OXYGEN IN THE TREATMENT OF PHTHISIS.

PROBABLY the best way of conveying to outside observers an idea of the value of any new treatment of such a disease as phthisis is by reporting cases in sufficiently full detail to enable them to form their own opinion of the gravity of the cases treated. Three such cases have already been recorded in the MEDICAL CHRONICLE (April, 1888).

In the present series very little selection was made of the persons submitted to the treatment of regular inhalations of ozone, except that of course all obviously hopeless cases were excluded. With this exception, cases in all three stages of the disease were admitted to treatment at the Manchester Hospital for Consumption, at Bowdon. The only other treatment consisted in residence in a profusely ventilated hospital, with good food, together with a routine medication by iodoform pills and cod liver oil, and occasionally the use of codeia to relieve cough.

It should also be stated that patients under this treatment alone, without ozone, generally do remarkably well during their stay in hospital, and hence it is often difficult to judge as to the influence of special modes of treatment. On the other hand, when patients are discharged and return to their own homes, the disease often makes a fresh start within a few weeks of their departure.

The method of administration of the ozone has already been described (MEDICAL CHRONICLE, April, 1888).

It may be sufficient to repeat here that each cylinder fully represents 7 litres of pure oxygen ozonized up to about 9 per cent, and under a total pressure on the cylinder of 6—8 kilogrammes.

The notes have been made in each instance (except Case 13) by Mr. Burnett, the Resident Medical Officer of the Institution.

An approximation to the proportion of bacilli found in the sputum is indicated by the signs B. I., B. II., and B. III. B. I., when there were very few found; B. II., when an average number were found; and B. III., when they were abundant. But no stress is laid upon these results of the bacillus search.

I.—CASES IN THE FIRST STAGE OF PHTHISIS (MALES).

Case 1.—S. B., æt. 21. Admitted Aug. 25, 1888. Occupation: Labourer.

Family History.—Good.

Previous History.—Scarlet fever in 1881. Typhoid two years ago. Before suffering from latter disease patient had always been strong and

healthy; but since, he has not been able to do more than three months' work without being laid up in bed for a time.

Present Attack.—Dates from convalescence from typhoid. Has gradually got weaker and lost flesh. Before the fever weight was 12 stone 4lbs. Cough began early in May, 1888. Hæmoptysis (½ pint) on two occasions at the end of May. Has had heavy night sweats.

Present Condition.—Weight, 139½lbs. Temp. 100°. Tendency to clubbing of fingers.

Respiratory System.—Impaired resonance in right supra-clavicular, clavicular, and infra-clavicular regions as far as the second rib. In infra-clavicular region, the difference between two sides very slight.

Posteriorly.—Dulness in right supra-spinous fossa and in upper part of inter-scapular region as far as spine of scapula.

On auscultation the only difference is divided respiration and audible expiration in right supra-spinous fossa, right inter-scapular, and right supra-clavicular region, with slight harshness of both inspiration and expiration in right inter-scapular region, but no alteration of quality in other regions. No adventitious sounds. (About a week after above notes were taken moist sounds were heard, but they were only present for a short time.)

Sputum.—Muco-purulent, containing bacilli B. II.

September 11.—Began to take ozone, one cylinder once a day.

„ 13.—Takes two cylinders a day. No cough or irritation. Patient says it induces sleep.

September 20.—Two cylinders twice a day. Gradually gaining weight.

October 7.—Three cylinders three times a day. On Sept. 25 patient began to take pil. iodof.)

October 12.—Four cylinders three times a day.

„ 20.—B. I. in sputum.

On two occasions patient took five cylinders, but each time the inhalation caused sharp pain in the side. Continues to take four cylinders.

November 27.—Slight hæmoptysis. Phlegm tinged. Ozone stopped.

„ 6.—B. I.

December 19.—Since last note up to now sputum has been tinged with blood, and no ozone given. Now resumed, four cylinders thrice daily. It causes, occasionally, slight cough, but no pain.

December 30.—B. I. Expectoration slight. Moist sounds at apex again heard freely.

January 21, 1889.—Discharged. The disease remains confined to apex, and does not extend below second rib (*i.e.* limited to same regions as on admission). Moist sounds are, however, freely heard over dull area. No signs of cavity. Expectoration slight. B. I. Weight, 151¼lbs.

Weight,	Aug.	28,	1888...	139½	lbs.	Weight,	Nov.	23, 1888...	154¾ lbs.
,,	,,	31	,,	...141½	,,	,,	,,	30 ,,	...153¾ ,,
,,	Sept.	7	,,	...144½	,,	,,	Dec.	6 ,,	...153¾ ,,
,,	,,	14	,,	...145½	,,	,,	,,	13 ,,	...149 ,,
,,	,,	21	,,	...145¼	,,	,,	,,	20 ,,	...153½ ,,
,,	,,	28	,,	...147¾	,,	,,	,,	27 ,,	...153½ ,,
,,	Oct.	4	,,	...148	,,	,,	Jan.	4, 1889...	152 ,,
,,	,,	12	,,	...149¾	,,	,,	,,	11 ,,	...152 ,,
,,	,,	19	,,	...150¼	,,	,,	,,	18 ,,	...151¼ ,,
,,	,,	26	,,	...151¾	,,				

Case 2.—J. R., æt. 24. Admitted January 15, 1889. Occupation: Rubber-worker.

Family History.—No history of phthisis in family.

Present attack began five months ago with cough, and pain in lower part of right side of chest. Cough has persisted up to the present time. At the commencement, for four months, he brought up a large amount of phlegm, but during the last month the quantity expectorated has been much smaller. On two occasions during the last week has spat a little blood, mixed with phlegm. No other hæmoptysis.

Present Condition.—Patient very sallow; not badly nourished. Pale appearance patient attributes to his having worked at glass cutting for many years, and not to the naphtha fumes to which he is exposed whilst following his present occupation. Respiratory System: Slight flattening of right infra-clavicular region; impaired resonance in right supra-clavicular, and also to a slight degree in right infra-clavicular, as far as second rib. Weak respiration in right supra-clavicular region not altered in quality. In right infra-clavicular region respiration rough, but expiration not affected. No moist sounds anteriorly. Posteriorly: Impaired resonance in right interscapular region and supra-spinous fossa. Over these regions respiration is weakened, but not altered in quality. Dry clicks are heard, especially on coughing. Bases clear, but just below spine of scapula on right side there is a patch of dulness extending downwards two inches, and over this the breath sounds are not much altered, but a number of dry crepitations are heard with every inspiration.

January 22.—Expectoration moderate in amount, containing bacilli, B. I. The percussion signs remain the same as on admission, but on auscultation, small crepitations are now heard in right supra-clavicular region. Posteriorly the "clicks" have in part given place to decided moist sounds, especially at level of fifth dorsal spine, and crepitations are heard for a distance of two inches lower. Expiration behind is decidedly prolonged, and of an obscure bronchial quality (obscured by adventitious sounds).

February 5, 1889.—Began to take ozone, one cylinder, three times a day. No bad signs.

February 12.—Now takes three cylinders three times a day.

February 16.—Expectoration moderate in amount. B. II.

Weight, Jan. 18.....	122½ lbs.	Weight, Feb. 15.....	130 lbs.
„ „ 25.....	126½ „	„ „ 25.....	132 „
„ Feb. 1.....	127½ „	„ Mar. 1.....	132¼ „
„ „ 8.....	127½ „	„ „ 8.....	133 „

Case 3.—R. H., æt. 17. Admitted May 5th, 1888. Occupation: French polisher.

Family History.—Father and one sister died of phthisis. Almost all patient's uncles on father's side dead from similar causes.

Previous History.—Patient has always been somewhat delicate, but never actually ill. Has usually had winter cough. During past winter, cough persistent, more troublesome, and accompanied by expectoration of yellowish mucus. Five or six months previous to admission had hæmoptysis in slight amount. No marked loss of flesh or strength. No night sweats.

Present Condition.—Fairly well nourished; weight, 114¼lbs.; evening temperature, 99·8°. No clubbing of fingers. Respiratory system: Respiratory movements easy and extensive, 22 per minute. Marked depression over third interspace on each side. Right side: Dulness in supra-clavicular, clavicular, and upper part of infra-clavicular regions. Over dull area breath sounds bronchial. No moist sounds. Some increase of vocal resonance at apex. Left: Impaired resonance (slight) above clavicle. No alteration of breath sounds. Posteriorly: Slight wasting in supra-spinous fossæ, especially on right side. Right: Dulness in supra-spinous and upper part of interscapular regions, with bronchial breathing, but no moist sounds. Increased whispering pectoriloquy, but no other sign of cavity. Left: Normal. Expectoration: Slight, containing bacilli.

May 10.—Began ozone inhalations, three cylinders daily, increased to four on June 3rd.

June 6.—Signs of softening or, at least, catarrh at right apex. Numerous moist sounds, limited to apex.

June 16.—Now takes ozone, three cylinders three times a day. Does not produce cough or any bad symptom. Patient feels somewhat drowsy after inhalations, and sleeps well at night.

June 19.—Sputum glairy and dilute, although scanty; not blood-stained; no bacilli.

June 20.—No bacilli. Patient expresses himself as receiving benefit from the ozone. Gaining weight.

June 25.—B. O. Moist sounds at right apex have disappeared.

July 4.—Expectoration very slight. B. I. No increase of dulness, and no sign of cavity except marked increase of whispering pectoriloquy behind, noticed on admission.

July 17.—B. II.

July 24.—B. II. in sputum. No other change.

August 10.—Breath sounds hollower in quality under right clavicle. Weight increasing. Still takes ozone three times a day without discomfort. At this date ol. morrh. and pil. iodoformi stopped on August 8th.

August 18.—B. I.

August 28.—B. I. Supply of ozone failed.

September 10.—Discharged. Disease has not progressed in the slightest.

Weight, May 11	114¼ lbs.		Weight, July 13	116 lbs.	
„ „ 18	114¾ „		„ „ 21	117¼ „	
„ „ 25	113¾ „		„ „ 27	117¼ „	
„ June 1	115½ „		„ Aug. 3	119½ „	
„ „ 8	116¼ „		„ „ 10	120 „	
„ „ 15	117 „		„ „ 17	119¼ „	
„ „ 22	116 „		„ „ 24	119¼ „	
„ „ 29	117 „		„ „ 31	117* „	
„ July 5	117 „		„ Sep. 7	117¾ „	

Ol. morrh. and pill stopped on August 8th. * Ol morrrh. and pil. iodoformi again taken.

R. H., re-admitted Nov. 19.—Since leaving hospital, two months ago, patient has enjoyed fair health. Throat began to be painful and voice hoarse about the beginning of November. (Cavity detected by Dr. Ransome on Nov. 10.) Expectoration more abundant while patient was at home. Loss of weight about 7lbs. Treatment during time patient was away:—Ozone inhalations and ol. morrh. The inhalations, however, were irregular, patient on some days only coming to the hospital once, and occasionally not at all.

Present Condition.—Weight, 110¾lbs. Temperature normal. Respiratory system: On the right side, dulness in supra-clavicular region, and also in infra-clavicular down to lower border of second rib. Over this area the breath sounds are of bronchial type. Few moist sounds. Posteriorly (right): Dulness in supra-spinous fossa and upper part of inter-scapular region, with some impairment of percussion note down to angle of scapula. On auscultation in supra-spinous fossa, amphoric breathing is heard over a limited area, and in same region are heard gurgles on coughing, large moist sounds on ordinary inspiration, increased vocal resonance, and marked pectoriloquy. Between spine of and angle of scapula moist sounds are heard, and breath sounds approach somewhat to bronchial type. Posteriorly (left): Percussion note impaired in supra-spinous fossa and upper part of inter-scapular region. At inner

part of supra-spinous fossa the breath sounds are bronchial in character. Moist sounds and clicks occasionally heard. Larynx: Voice hoarse. Laryngoscopic examination difficult on account of rigidity of epiglottis. Epiglottis much infiltrated and thickened, but not ulcerated. Cords red and thickened. No ulceration seen. He gradually became weaker, and died on April 2nd, 1889.

Did not take ozone after re-admission.

Cases in First Stage (Females).

Case 4.—S. L., æt. 23. Admitted, January 6, 1889. Occupation; housework.

Family History.—Father died of phthisis. Two aunts on father's side died of some lung disease. A cousin, a daughter of father's brother, is suffering from advanced phthisis.

Previous History.—In April, 1888, had slight pleurisy, followed by a slight cough which has persisted up to present time. In August had *very* slight hæmoptysis.

Present Condition.—Patient well nourished. Chest well shaped, with very slight flattening under left clavicle. Good movement on both sides, but right moves better than left. On percussion, slightly impaired resonance in left supra-clavicular region. Fair resonance in both infra-clavicular regions, but slightly higher pitched in the first space on the left side, and this difference is even more marked in second space. On auscultation, respiratory sounds are weaker on left side than on right, but not altered in character. No adventitious sounds. (These remarks apply to dull area above mentioned). Posteriorly: Percussion. Dulness in inter-scapular region of left side as low as junction of middle and lower thirds. In extreme upper part of right inter-scapular region percussion is high-pitched, and the same applies to both supra-spinous fossæ. Bases clear. Vocal fremitus more marked over left apex. On auscultation, respiration is accompanied by numerous dry clicks in left inter-scapular region, and in left supra-spinous fossa. A few are heard in corresponding regions on right side. Forced inspiration increases the number and intensity of the clicks on left side, but causes their disappearance on right side. Respiration weak and somewhat obscure on left side.

Before admission (November 15) sputum contained bacilli (B. II.) Since admission there has been no expectoration.

January 12.—Began to take ozone. One cylinder once a day. No bad effects.

January 15.—One cylinder three times a day. Produces drowsiness.

January 20.—Two cylinders three times a day. No cough. No irritation.

February 10.—Three cylinders twice a day.

February 23.—Discharged at own wish. On discharge moist sounds were detected on left side at apex.

Weight on admission...	126 lbs.	Weight, January 30 ...	127¾ lbs.
„ January 9.....	126 „	„ February 6 ...	128¼ „
„ „ 16.....	127 „	„ „ 13 ...	127½ „
„ „ 23.....	127¼ „	„ „ 20 ...	127 „

Case 5.—M. J. B., æt. 19. Admitted May 14th, 1888. Occupation: fustian cutter.

Family History.—An uncle and a cousin on father's side died of phthisis. Father died of pneumonia. No other history of phthisis in family.

Previous Personal History.—Always healthy up to two years ago. At that time patient caught cold, and this left a persistent cough. Patient noticed herself gradually losing flesh, and getting weaker. Expectoration gradually became more abundant. Night sweats about a month ago. Hæmoptysis on one or two occasions six months ago; quantity, a teaspoonful each time.

Present Condition.—Weight, 103½lbs. Temperature, 97°. No clubbing of fingers. No red line on gums. Respiratory system: Chest measurements, right, 16 inches; left, 15½ inches. Elevation and expansion: Movements free and extensive. Slight flattening in right infra-clavicular area. Right: Impaired resonance above, and immediately below clavicle. Here sibilant rhonchi mask the breath sounds, and in addition to adventitious sounds, there is only to be detected some prolongation of expiratory murmurs. Left: No dulness on percussion. Sibilant rhonchi freely heard at apex, and below clavicle. Posteriorly. Right: Percussion note higher pitched and shorter in duration from apex down to level of sixth dorsal spine. Here, as well as on opposite side are heard rhonchi. Expectoration: Slight and frothy. No bacilli.

May 28th.—Began to take ozone. Takes two cylinders each evening. No irritation or cough ever caused by ozone. No bacilli in sputum.

June 4th.—No increased bronchial catarrh. Three cylinders now taken. No cough or irritation produced. Sleeps better.

June 14th.—Four cylinders. Bronchial catarrh at both apices still continues, but expectoration has now ceased.

July 2nd.—No change locally. Gradual increase in weight. No expectoration.

Weight, May 14.....	103½ lbs.	Weight, June 27.....	114¼ lbs.
„ „ 23.....	105¼ „	„ July 4.....	114¼ „
„ „ 30.....	107½ „	„ „ 11.....	114¼ „
„ June 6.....	110¾ „	„ „ 18.....	117½ „
„ „ 13.....	112¼ „	„ „ 25.....	116 „
„ „ 19.....	117½ „		

July 30.—Discharged. Rhonchi still present at apices. No expectoration. Patient, after discharge, remained as ward maid, but did not continue ozone.

September 14.—No appreciable difference at apices on percussion. Dry rhonchi and wheezing at both apices. Character of respiratory murmur cannot be heard. Patient complains of some shortness of breath on exertion, otherwise she continues well, and since discharge, has gained in weight 2lbs. (now weighing 118lbs.).

December 21.—Had attack of acute suppurative tonsillitis. No physical signs of phthisis. Before fairly convalescent from tonsillitis, patient weighed 117lbs.

Case 6.—A. R., æt. 21. Admitted May 24, 1888. Occupation: Office cleaner.

Family History.—Father living, 47, healthy; mother 45, healthy; one brother and one sister living, healthy; two died in infancy. No history of phthisis or struma in family.

Previous History.—Has always been ailing, but beyond diseases of childhood, has not had any illness of moment. Present attack began eighteen months ago, with pain in left side and slight cough. Never any hæmoptysis. Night sweats sixteen months ago. Expectoration: mucoid, slight.

Present Condition.—Slight dulness at left apex down to second rib. Breath sounds somewhat obscured, but usually appear to be bronchial. Many bronchitic râles. Similar signs posteriorly. On right side respiratory murmurs harsh above clavicle.

May 28.—Began to take ozone. Two cylinders. It does not cause irritation or induce cough. Expectoration scanty. No bacilli.

June 4.—Three cylinders. No bacilli.

June 14.—Four cylinders. B. O. Expectoration varies from day to day in regard to quantity. When present it is always frothy and dilute.

June 21.—Weight increasing. No expectoration. Few moist sounds.

June 30.—Discharged at own wish.

Weight, May 30.....	116½ lbs.	Weight, June 27	122¾ lbs.
„ June 6.....	118 „	„ Feb. 26, 1889.	124 „
„ „ 13.....	120 „	„ Mar. 19, „	122 „
„ „ 20.....	122 „		

Since discharge patient has several times been seen at Hardman Street, and when last examined she continued well. There were then no moist sounds to be heard, and only impaired resonance at apex to be detected.

February 25, 1889.—Dulness (slight) over left apex. Moist sounds in same region. Right apex slightly affected.

Remarks on Cases in the First Stage.—In each of the six cases there

is some improvement in the general condition during their stay in hospital.

In Case 1 there was a gradual gain of 15lbs. in the first three months, falling off on the occurrence of hæmoptysis, and on ceasing the ozone treatment, and again an increase on resuming the ozone.

In Case 2 there was a gain of weight of 10½lbs. in three months.

In Case 3 the weight increased 6lbs. in three months and after this a decline of 3lbs., after stopping the use of iodoform and cod-liver oil. On leaving the hospital the inhalations were only practised very irregularly—he lost 7lbs. in weight, and the disease had evidently assumed an acute form and had attacked the larynx.

Case 4 gained 2¼lbs., after commencing the ozone, and returned to work, apparently well, with no expectoration.

In Cases 5 and 6 there is no record of bacilli being found, but there can be little doubt that they were phthisical. In Case 5 there was a total gain of weight of 14lbs., and in Case 6 of 6lbs., and they both returned to work apparently well, no fresh outbreak of the disease being noted after a lapse of six months.

Cases in Second Stage.

Case 7.—J. T. J. (See printed notice, Medical Chronicle, April, 1888.)

March 22, 1888.—Takes five cylinders of ozone daily. Sputum contains many bacilli (B. III.).

April 4.—Continues to increase in weight. Cough and expectoration unaltered—both slight. Sputum B. III.

April 14.—Disease appears stationary. Patient takes long walks at a good pace (4 miles per hour) without fatigue.

April 28.—Discharged. Sputum crowded with bacilli.

Physical signs :—Dulness at right apex to second rib. Breath sounds over this area of bronchial nature. Crackles present. No sign of cavity. Left apex normal.

Weight on admission	...	108lbs.		Weight on March 23	...	120½lbs.	
„	*Jan. 21 ...	110½	„	„	„ 30 ...	122½	„
„	Feb. 15 ...	115	„	„	April 6 ...	124	„
„	„ 24 ...	117¾	„	„	„ 13 ...	124¼	„
„	March 2 ...	119¼	„	„	„ 20 ...	124¾	„
„	„ 9 ...	119½	„	„	„ 27 ...	124¾	„
„	„ 16 ...	120¼	„				

After discharge, patient attended as out-patient for a few weeks, and then went to Wales. When last heard of, he was gaining weight and doing well.

J. T. J.—Re-admitted November 22, 1889. Whilst in Wales patient gained 10lbs. in weight.

* Treatment by ozone began Jan. 21.

Present Condition.—Weight, 135lbs. Respiratory system: Some wasting under right clavicle. Movements free and apparently equal. Anteriorly: Right. Dulness on percussion over right apex down to second rib. Over this area breath-sounds are much diminished in intensity, but not markedly altered in quality. Moist sounds, having a somewhat consonating quality, heard in fair numbers over region mentioned. Left: No perceptible abnormality. Posteriorly. Right: Percussion-note dull and high-pitched in supra-spinous fossa and inter-scapular region of right side. Breath sounds more bronchial than in front, expiration and inspiration being equal in length and separated by a marked interval. No moist sounds behind. Left: Normal.

Began to take ozone shortly after re-admission (Dec. 1); three cylinders three times a day.

December 25.—Four cylinders three times a day.

January 2, 1889.—B. II. in sputum.

February 14.—B. II. in sputum. The dulness remains the same as on admission, but moist sounds not so numerous. Patient spat a little blood each morning for three days. Weight on re-admission, 134lbs.; February 28, 132½lbs. Can now walk four miles an hour without fatigue.

April 1.—Discharged. Weight on discharge, 127½lbs. No change in condition of lung; disease remains limited to apex.

Since March 2nd has had slight hoarseness. The laryngoscope reveals inflammation of right ventrical cord, which at its two extremities is of a bright red colour. Rest of larynx apparently normal.

Case 8.—E. F., æt. 29. Admitted July 18, 1888. Occupation: Bricklayer.

Family History.—Good.

Previous History.—Had typhus fever at 12. In 1884 had an attack of bronchitis. Twelve months ago gave up his work. At this time he had a rather bad cough, but no expectoration. Never any hæmoptysis. Night sweats twelve months ago.

Present Condition.—Nails incurved; fingers tend to be clubbed. Weight, 141½lbs. Temperature normal. Chest measurements: Left, 17¼; right, 17½. Wasting and flattening most marked on left side in supra and infra-clavicular regions. Respiratory movements fairly extensive, perhaps more so on the right side. Right: Resonance impaired at apex. Breath sounds high-pitched and expiration prolonged. Left: Similar slight dulness above and immediately below clavicle, with bronchial breathing, but no moist sounds. Posteriorly: No dulness. Prolonged expiratory murmur over both lungs. Expectoration: Greenish and slightly nummular, containing many bacilli (B. III.).

July 28.—Began to take ozone. Three cylinders twice daily. No cough; no irritation.

Aug. 1.—Three cylinders three times a day.

Aug. 4.—Vomited after ozone once. Cough occasionally after inhalation.

Aug. 17.—Still occasional cough after ozone. Weight increasing Slight discharge from fistula.

Aug. 26.—Cough much less troublesome. Expectoration considerably less. Weight stationary. Fistula discharging. B. II. in sputum.

Aug. 28.—Ozone supply failed. B. II.

Sept. 6.—Ozone renewed. Takes same quantity as before. Patient voluntarily states that he feels more buoyant and considerably better after each inhalation ; he notices a marked difference if he fails to take ozone even once a day.

Sept. 9.—Sputum moderate in quantity. B. II.

Sept. 16.—B. II. in sputum.

Sept. 20.—Weight stationary. On left side dulness seems clearing up, but breath sounds remain bronchial ; while on right side dulness is marked above clavicle and in first costal interspace, but there is no further alteration in breath sounds. Behind, the dulness is more marked on left side, but there is imperfect resonance also on right, with bronchial breathing on each side. Patient says he can now walk three miles an hour without fatigue.

Oct. 10.—Continues ozone inhalations as before. B. III.

Nov. 5.—Discharged. Weight gained $5\frac{1}{4}$ lbs. Sputum B. II.

E. F., re-admitted Jan. 11th, 1889. Since leaving hospital (Nov. 5), patient has been confined to bed for ten days with cold, bad chest, and diarrhœa. During his absence from hospital, with exception of 3—4 weeks, he took ozone, four cylinders twice a day. Loss of weight between discharge and re-admission, 10 lbs.

Present Condition, Jan. 12.—Weight, $136\frac{3}{4}$ lbs. Chest movements limited. Right : Dulness from apex to third rib. On auscultation rather large moist sounds and irregular clicks freely heard, the former being audible as low as the fourth costal interspace. No gurgling on coughing. Slight increase of whispering pectoriloquy. Breath sounds bronchial in character. Left : Resonance impaired from apex to second rib, and on auscultation bronchial breathing and a few moist sounds immediately below clavicle. No signs of cavity. Posteriorly Right : Dulness to level of fifth dorsal spine, with bronchial breathing and moist sounds (the moist sounds heard to level of sixth spine). No gurgling on coughing. Marked whispering pectoriloquy at upper part of lung. Left : Slight impairment of resonance at apex, but no alteration of breath sounds. No adventitious sounds.

For a month previous to admission patient had not been taking ozone. Began at once to take four cylinders three times a day.

January 15, 1889.—B. III. Sleeps better; appetite improved; weight increasing.

February 14.—B. III. Sputum moderate in quantity.

February 22.—Weight 143 lbs., against 136 lbs. on admission.

Discharged April 25th, having remained stationary for the last six weeks.

Case 9.—Harriet B., æt. 27. Admitted July 27, 1887.

Family History.—Good.

Previous History.—Has been out of sorts for two years. Cough came and went, becoming persistent about three months before admission, and taking a decided turn for the worse six weeks later. Has been a good deal short of breath lately, complained of frequent pains in her limbs and joints. For the six weeks previous to admission has felt very weak and tired, and her appetite has been poor and capricious. Catamenia stopped with pain at the usual period.

Present Condition.—Weight 110½ lbs. Temperature normal. Fingers not clubbed. Respiratory system: Respiration 20. On left percussion note dull over apex in front down to third rib. Expansion diminished over the apex. Vocal fremitus slightly increased. Breath sounds harsh; crackles with both inspiration and expiration. Posteriorly: Crackles above and below left spine of scapula; dulness and increased vocal fremitus above spine. Right side: Normal. Expectoration: Scanty; muco-purulent; containing many bacilli.

[The above notes are abstracted from those taken by Mr. Cottam on patient's first admission.]

Re-admitted January 23, 1888, under Dr. Simpson.

Condition on March 20, 1888. Dulness left apex down to third rib. Moist sounds freely heard over dull area. No dulness at right apex, although there are auscultatory signs of bronchial catarrh limited to upper part of this lung.

March 20.—Began to take ozone.

April 4.—Still bronchial catarrh with frothy expectoration. B.O.

April 12.—No bacilli. Sputum unfavourable for examination.

April 23.—No bacilli. B.O.

May 5.—Expectoration absent, although there is still catarrh at both apices.

Weight, Jan. 23	111¼ lbs.	Weight, Ap. 11.....	116¼ lbs.
„ Mar. 20	116 „	„ May 2.....	117 „
„ „ 28	117 „	„ „ 20.....	118½ „
„ Ap. 4	118 „	„ „ 30.....	117½ „

Discharged June 14. When discharged patient had shortness of breath on exertion, with slight cough but no expectoration. No advance of disease and no improvement in physical signs.

April, 1889.—This patient has been in service since last June, and remains in the same condition. No advance of disease.

Remarks on Cases in Second Stage.—In these three cases we again note the steady increase in weight after admission to hospital. This increase amounts to nearly 17 lbs. in three months in Case 7, and a further increase of 10 lbs. after leaving; but towards the latter end of his second four months' stay in hospital, he again lost 7lbs., owing to hæmoptysis and to laryngeal irritation. In Case 8 the gain in weight was 5¼ lbs. during his first period in hospital, and after a loss of weight of 10 lbs. during eight weeks spent at home; after re-admission he regained 7lbs. in three months, whilst taking twelve cylinders of ozone per diem. Case 9 gained 6½ lbs. in weight during her stay in hospital, and was able to go into domestic service. The results of the bacillus search in two of these cases are interesting, as showing the possibility of steady improvement in general condition, and diminution in the physical signs of disease co-existing with the constant presence of bacilli in the sputum. It is very difficult to judge whether the fresh outbreak of tubercular infection in Case 8 preceded or followed the cessation of ozone inhalations, but we may note that the proportion of bacilli in the sputum showed no diminution, though the total quantity of expectoration was lessened. No such doubt, however, can exist in Case 7, for the affection of the larynx commenced whilst he was steadily pursuing the inhalation of ozonized oxygen three times a day, three or four cylinders at a time. It thus seems certain that the inhalations, as hitherto practised, are not entirely efficacious against fresh infection, though it is probable that when they are regularly practised, they in some way assist the patient's system in its resistance to their inroads.

Cases in Third Stage.

Case 10.—N. R., æt. 18. Occupation: Servant. Admitted, March 18, 1888.

Notes on condition on admission lost. Beyond that patient had a cavity at apex of right lung, and that bacilli were found in sputum, there is no history of case.

March 20.—Began to take ozone—two cylinders daily.

April 2.—Three cylinders. No bad effects.

„ 4.—Two specimens of sputum failed to show bacilli.

„ 13.—Four cylinders now taken. Bacilli in sputum, B. I.

„ 20.—No bacilli. Expectoration lessened; muco-purulent.

May 2.—Few bacilli (B. I.). Signs of cavity at right apex still present. No moist sounds.

May 14.—Discharged.

Weight, March 8	87¼ lbs.	Weight, April 13	87½ lbs.
„ „ 20	88¾ „	„ „ 20	87¼ „
„ April 2	88 „	„ May 2	89½ „
„ „ 4	88 „	„ „ 14	88¼ „

For about three weeks after discharge patient came to hospital each evening for ozone. Cough gradually became more troublesome, and patient lost weight. About the middle of June patient went to live at Timperley, and on September 16 she came to hospital and was said to be doing well, cough having improved, shortness of breath less marked, and patient having gained 10 lbs. in weight.

Case 11.—B. H. (see published notes, MEDICAL CHRONICLE, April, 1888).

March 13.—Takes four cylinders of ozone daily.

March 23.—Increased frothy expectoration. Ozone stopped. No bacilli found in sputum. This, however, was too fluid for examination.

March 29.—B. II. in sputum. Ozone not renewed.

April 4.—Bronchitis better. Inhalations of ozone (four cylinders) resumed. Patient volunteers the statement that ozone induces sleep, and relieves his cough. No bacilli.

April 7.—Slight bronchial irritation. Ozone reduced to two cylinders.

April 12.—Now takes four cylinders. Still slight bronchial catarrh.

April 24.—Sputum muco-purulent. Many bacilli. B. III. No bronchitis. Ozone, four cylinders.

April 29.—Many bacilli. B. III.

May 4.—Discharged. Lungs in same condition as on admission. No cavity to be found on right side. Moist sounds, however, are abundant. Small cavity in left apex.

Weight, Oct. 17, 1887	116 lbs.	Weight, April 6	132½ lbs.
„ * Jan. 20, 1888	128¾ „	„ „ 13	132¼ „
„ Feb. 15	131 „	„ „ 20	131¾ „
„ March 9	132¾ „	„ „ 27	132¼ „
„ „ 30	132¼ „	„ May 4	130¼ „

After discharge, patient went to Manchester daily to his work, but came each evening to the hospital for ozone.

Discharged June 18, 1888. Sputum B. III. Lost about two pounds in weight.

B. H., re-admitted July 16, 1888. Has been taking ozone during his absence from hospital with the exception of two weeks. For seven weeks after discharge patient felt very well, and followed his work in Manchester. (He lived in Bowdon, but went to Manchester daily.) He noticed that the air of Manchester seemed to stifle him, and also that it brought on a fit of coughing about two o'clock each day. Hæmoptysis commenced seven weeks after discharge, and a week later night

* Ozone first given.

sweats appeared. At this time he gave up his work. Weight lost while away, 13 lbs.

Present Condition (July 16, 1888).—Temperature: Normal. Weight: 117 lbs. Night sweats. Respiratory system (left). Anteriorly: Dulness from apex to third space; cavity in first costal interspace; moist sounds freely heard, but not so numerous below third space. Right: Dulness to third rib; signs of cavity in first interspace; moist sounds to fourth rib; friction sound in fifth space. Posteriorly: Signs of cavity at each apex at level of second and third dorsal spines; bronchial breathing lower down, with moist sounds on coughing.

July 27.—Four cylinders once a day. B. I. in sputum.

July 30.—Ozone. Two cylinders twice a day. General condition better.

August 17.—Moist sounds fewer. Cough less troublesome. Night sweats have ceased. (Patient took pil. atrop., 1-50th of a grain.)

August 28.—Supply of ozone failed. Patient gradually improving, and all acute symptoms have disappeared. B. II. in sputum.

September 6.—Ozone renewed; three cylinders three times a day.

September 16.—B. I.

September 29.—Condition stationary. Signs of cavity in left first space, with catarrhal signs for a space lower. On right side movement exaggerated; dulness not so absolute; the breath sounds bronchial and exaggerated from apex to third rib; moist sounds present for same distance. Signs of cavity doubtful. Expectoration considerably lessened.

October 11.—B. I.

November 6.—B. I.

November 18.—Discharged. Weight, 125¾ lbs. At this time some bronchial irritation going on. Percussion gave same results as on admission.

Patient comes to Hospital twice a day for inhalations; four cylinders each time.

April, 1889.—Has lost 4 lbs. in weight; physical signs unchanged.

Case 12.—J. M., æt. 30. Admitted, February 13. Occupation: Porter.

Family History.—Good. No history of phthisis in family.

Previous History.—Patient has been a heavy drinker for some years, and this has often led to neglect of food. No illness of any kind up to three years ago, when he had an attack of bronchitis. It is somewhat doubtful if this was not the beginning of present attack, but patient says he recovered perfectly, and that present attack began in November, 1888, with cough and expectoration of frothy phlegm. No hæmoptysis at that time. Considerable loss of flesh during last six months. Heavy night sweats occasionally.

Present Condition.—Patient is a well-built and strong-looking man. Weight, 140¼ lbs.; tendency to clubbing of fingers. Temperature:

Normal. Respiratory system: Movements extensive and equal. Some flattening above and below each clavicle. On percussion, there is found dulness in left supra-clavicular, clavicular, and infra-clavicular regions, as far as second rib. Over these regions moist sounds are freely heard, and these to some extent obscure the breath sounds, which, however, appear to be bronchial. Above the clavicular amphoric bubbles are heard. No alteration of fremitus, no pectoriloquy, and no gurgling on coughing. Posteriorly: Dulness in supra-spinous fossa, and in upper part of inter-scapular region to level of spine of scapula, with moist sounds and amphoric crackles at apex. Right side normal.

February 16.—B. III. in sputum.

February 14.—Began to take ozone, two cylinders twice a day. No cough or irritation produced.

March 12.—Three cylinders three times a day.

March 13.—Dulness to same extent as on admission. The bubbles heard on auscultation have lost the amphoric character noticed above. They are increased on coughing, but do not amount to gurgles.

March 15.—Discharged for irregularity.

Weight—	February	15	$140\frac{1}{4}$ lbs.
,,	,,	22	147 ,,
,,	,,	28	$149\frac{3}{4}$,,
,,	March	8	$150\frac{1}{4}$,,

Case 12 had only been under treatment for five weeks when the notes were taken, but it will be observed that he had gained 10 lbs. in weight.

Case 13.—R. B., æt. 46, domestic servant, residing at Dunham. Commenced ozone inhalations in November, 1888.

Family History.—Father and mother and a brother and sister phthisical.

Personal History.—Enjoyed good health until 16 years ago, when she had a severe attack of acute pleurisy, with effusion on the left side, which was slow in subsiding, and left the chest movements much impaired. Two years ago she became thinner, and had a constant cough and shortness of breath, and it was found that she had bacilli in her sputum. Her condition on commencing the inhalations was—

Weight: 116 lbs. On right side: Supra-clavicular dulness on percussion, with bronchial breathing. Moist crepitation in the inter-scapular region. Puerile breathing at base. On left side: Dulness on percussion to four inches front and back. Amphoric resonance and whispered pectoriloquy, with occasional gurgling; crepitus above and under the clavicle in front. Dry crackles from two to four inches in front.

April, 1889.—After six months regular inhalations, no change in physical signs, but has gained weight to the extent of 14 lbs.

Remarks on Cases in the Third Stage.—Case 10 can scarcely be re-

garded as an instance of the favourable influence of ozone, as she only took four cylinders per diem as a maximum towards the latter end of her stay. We can hardly suppose that the stationary character of the disease during her ten months of domestic service was due to the temporary use of the ozone. Case 11 is very interesting, as showing the favourable influence of hospital life with all its adjuncts, including perhaps the beneficial action of ozone inhalations. The patient gained weight to the extent of 16 lbs. in the first three months, and retained it until he left; and his falling off in this respect afterwards to the extent of 15 lbs. was not due to want of food, as he was in fairly good circumstances, and it is noteworthy that he regained about 9 lbs. of his loss during his second stay in Hospital and lost very little during the five months that he has since spent out of Hospital, and throughout this latter time he has constantly visited the institution twice a day for the purpose of taking the inhalations.

Case 12 remained under treatment only four weeks, but in this time he had gained 10 lbs. in weight; and Case 13 gained 14 lbs. in weight in the course of six months' treatment.

Concluding Remarks.—It will be seen that of the thirteen cases in all stages, most of whom have been under observation for more than a year, one of them more than two years, only two have distinctly deteriorated in the time, and one of these has died of laryngeal phthisis.

The question to be laid before a jury of medical men, is whether in such a series of cases of phthisis as those described we could expect such favourable results from other modes of treatment. For my own part, I confess that although we have often had highly gratifying results from treatment in the Hospital at Bowdon, I do not remember any results quite so satisfactory as these now laid before you. Such continuous freedom from fever, absence of night sweats, diminution in the amount of expectoration, improvement in appetite and in sleeping power, and such consequent gain in weight.

But, on the other hand, it must be pointed out that the ozone does not appear to have acted as a direct germicide, and that the control over the disease does not seem to have been due to its direct action upon the bacillus of tubercle. I greatly doubt whether we shall ever discover a means of reaching this organism in the consolidated exudations of phthisis, impervious to air and even to the blood; but I can well understand that ozone may have a beneficial influence upon the general health of patients, and that it may enable the still healthy portions of the lungs to resist the noxious influence of the organism, and even ultimately to cause it to die out of the parts already attacked.

John Heywood, Excelsior Printing and Bookbinding Works, Manchester and London.