OBSERVATIONS
ON THE
MEDICAL ADMINISTRATION
OF
OZONIZED OILS.

BY
THEOPHILUS THOMPSON, M.D., F.R.S.,
PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION, ETC.

Received May 23d.—Read June 28th, 1859.

OZONE, since its discovery by Schönbein, fifteen years ago, has proved an object of increasing interest, both to the chemist and to the physiologist. Air unduly charged with it is capable of acting strongly on the mucous membrane, rendering respiration difficult, and in some animals even producing fatal effects. The natural presence of ozone in moderate proportion in the atmosphere appears, however, to prove highly beneficial to the human system, and it seems therefore reasonable to inquire whether, if this agent could be medicinally administered in a definite and graduated manner, some remedial effects might not be obtained. Mr. Dugald Campbell, the analytical chemist to the Consumption Hospital, suggested to me that its administration might possibly be effected through the medium of ozonized oils, which he obligingly prepared for me by saturating cer-

tain oils with oxygen and then exposing them for a considerable time to the direct rays of the sun. It may be interesting to remark that one indication of the satisfactory progress of the operation is the appearance of a peculiar, acid, watery-looking fluid at the bottom of the vessel; it may also be mentioned that the fact of the oils being charged with ozone can be rendered obvious by the usual tests, viz., by the bleaching properties which they possess, and the action which they exert upon preparations of iodide of potassium and starch.

During the last few years I have from time to time administered oils thus prepared, and I now offer to the Society a short and simple statement of the results observed in all the patients to whom they were given, of whose cases sufficient records have been preserved.

John H—, a labourer, æt. 33, having phthisis in the first stage, as indicated by dull percussion, prolonged expiratory murmur, wavy inspiration, and increased vocal resonance on the right side, was admitted on the 8th of October, 1855; he took salines for two days, afterwards two drachms of ozonized sunflower oil twice a day. Under the use of the medicine his pulse was reduced in a few days from 104 to 92. He left the hospital on the 22d of October, in improved health, but without any increase in weight.

Frederick C—, æt. 18, five feet eight inches in height, weight seven stone twelve and a quarter pounds, was admitted on the 4th of October, affected with phthisis in the first stage. He took salines for six days. On the 10th, the pulse being then 118, he was ordered to take two drachms of ozonized sunflower oil three times a day; on the 20th the pulse had fallen to 102, on the 24th to 86, and his weight had increased to seven stone thirteen and a half pounds. The pulse continued low under the use of ozonized cocoa oil, but on the 31st of October, the supply of ozonized oil being exhausted, simple oil was substi-

tuted, and on the 3d of November the pulse had risen to 108.

Mary T—, admitted October the 2d, with a pulse at 108, commenced the use of ozonized sunflower oil on the 10th. This patient's pulse, on the 29th, was reduced to 100, but her weight remained unchanged.

Joseph S—, æt. 20, admitted the 17th of October, 1856; having, among other symptoms, crackle (dry crepitation) at the apex of the left lung, and venous hum in the right jugular, was treated with simple saline medicines till the 21st of October, when he was directed to take two drachms of coarse cod-liver oil, ozonized, twice a day. This patient's height was five feet eleven and a half inches, his weight ten stone, pulse 108. On the 25th the pulse was 88, on the 28th, 90, and on the 3d of November it had risen to 102; the dose of ozonized oil was then increased to half an ounce; the cough and expectoration continued unchanged, but other symptoms improved, and under the augmented dose of ozonized oil the pulse again slightly fell.

William B—, æt. 8, with a vomica at the upper part of the right lung and some tubercular deposition in the left, took ozonized coarse cod-liver oil twice a day, from the 30th of October to the 3d of November, the pulse falling from 120 to 100 during those three days; the medicine was then administered three times a day, and in less than a week the pulse was reduced to 80.

Samuel H—, æt. 28, having vomica on the left and softened tubercle on the right side, took coarse ozonized cod-liver oil from the 29th of October to the 8th of November, but the pulse was not influenced, remaining about 90 throughout.

Sarah W—, æt. 23, admitted October the 22d, took ozonized coarse cod-liver oil from the 25th of October to

the 2d of December; her pulse continued about 108 throughout, but she felt better and increased in weight from seven stone eight pounds to seven stone thirteen and a half pounds. In this patient there was murmur in the jugular vein, a symptom indicative of a condition of the system probably favorable to the efficiency of cod-liver oil.

David J—, having tubercular deposit in both lungs, which had advanced to softening on the left side, was admitted September the 22d, 1857; his height was five feet seven inches, and his weight nine stone one and a half pounds. He took simple cod-liver oil till the 10th of December, his weight being then ten stone and his pulse 112; he was then ordered ozonized cod-liver oil, and his pulse, with one slight fluctuation, gradually fell to 76. On the 6th of January simple cod-liver oil was substituted, but the pulse being on the 13th of January 108, the ozonized oil was resumed. On the 15th, 17th, and 19th of January the pulse varied from 88 to 84; simple coco-oleine was then substituted, and the pulse rose in a few days to 92. On the 3d of February ozonized coco-oleine was administered, and on the 6th the pulse was 86.

Thomas R—, æt. 15, was admitted December the 2d, 1857, having tubercular deposit on the left side, as indicated mainly by dull percussion and harsh respiration. He commenced the use of ozonized cod-liver oil, in doses of two drachms twice a day, on the 8th of January, 1858, the pulse being at that time 95; on the 13th the pulse had risen to 104; the dose of ozonized oil was then increased to half an ounce, and in a few days the pulse had fallen to 86.

Thomas W—, æt. 17, in an early stage of phthisis, was admitted on the 14th of December, 1857. His height was five feet five inches, weight nine stone four pounds, respirations 26. He took two drachms of simple cod-liver oil

twice a day till the 6th of January, when, the pulse keeping up steadily about 90, the same dose of ozonized cod-liver oil was substituted; on the 3d of February the pulse had fallen to 68.

Charles T—, æt. 43, admitted on the 12th of January, 1858, had vomica on the right side and tubercular deposition on the left. He had suffered from cough and expectoration for two years, and presented other evidences of advanced consumption, being so much emaciated as to weigh only seven stone nine and a half pounds, although his height was five feet four inches. He was treated in succession with salines and mixture of tolu; on the 20th of January the pulse was 80; on the 23d, the pulse being at 86, three drachms of cod-liver oil were given twice a day; the pulse, with some fluctuations, became decidedly quicker, and on the 28th of January was 92. Three drachms of ozonized coco-oleine were then substituted; on the 1st of February the pulse was 88, and on the 3d, 80.

Jane J—, æt. 26, a very nervous patient, having arterial murmur and venous hum, but with slight indications of the presence of phthisis in the first stage, was admitted on the 9th of December, 1857. She was at first treated with ammonia, cascarilla, and prussic acid; but the pulse rising under this treatment, digitalis and aconite were administered, without, however, any permanent effect in lowering the circulation. On the 7th of January quassia and iron were given, and on the 13th ammoniated cascarilla mixture was resumed. On the 27th of January ozonized coco-oleine was given twice a day, in two-drachm doses. The pulse, which on the 29th of January was 104, on the 2d of February had fallen to 88, but on the 6th it had risen to 112. It is possible that an increased dose of the ozonized oil, if at this time administered, might have maintained a more decided effect on the pulse, but any conclusions derived

from the state of the circulation regarding the action of medicines on this patient are rendered very uncertain by her highly nervous temperament.

Susan F—, admitted March the 16th, 1858, took cod-liver oil for a week, without any obvious effect on the pulse; ozonized oil was then given, and the pulse remained for several weeks during its use about 100, but on the discontinuance of the ozone speedily rose to 110.

In another example, of which, however, I have not preserved full details, after the pulse had fallen considerably under the use of ozonized oil, I observed at one of my visits that the pulse had risen; but on desiring Mr. James Ford, my clinical assistant, who took an active interest in these investigations, to record it as an exceptional case, he replied: "There is an omission in the register; this patient has not had ozonized oil the last three days, for the supply is exhausted."

For facility of reference, the more obvious results are appended in a tabular form. The few instances in which the number of respirations in the minute is recorded are not sufficient to establish any conclusion, but they certainly do not indicate that the remedy had any particular influence in this respect.

During my absence from the hospital my friend Dr. Scott Alison administered ozonized oil to some of the patients. I am happy to be allowed to append his reply to my inquiry regarding the result of his experiments, and to find that his independent observations are corroborative of my own. Dr. Alison remarks: "Under my direction only four of the patients had had ozonized oil given in such a manner as to be likely to give any result. Unfortunately, all the patients were in the third stage of the disease, and no lasting benefit was experienced."

"In two cases a remarkable reduction in the rapidity of the pulse occurred under the use of the ozonized oil, the reduction amounting to about twenty beats, while this improvement could not be referred to any other cause. I attach some value to this observation, for I prescribed the oil totally divested of all prejudice in its favour, and I have always been reluctant, on imperfect grounds, to refer results to the operation of medicine. The oil was given in the doses employed by yourself. If ozonized oil can reduce the rapidity of the circulation, a feature of great prominence in phthisis, this remedy possesses a most valuable property, rendered still more valuable by its contributing at the same time to improve the general health."

In order fully to appreciate the evidence adduced in this paper, it is important to observe that in some of the patients the use of simple and of ozonized oil was more than once alternated, with corresponding variation of effect. In the case of David J— the alternation was made three times, and the result was, in each interchange of treatment, so direct and remarkable, as to make that particular example equivalent in force to three experiments. It is difficult to review the history now presented without being impressed with the conviction that the administration of ozonized oils has a remarkable tendency to reduce the frequency of the pulse.

Of the fourteen patients whose cases are detailed in this communication there are only two in whom no such effect was observed, and although in a few instances the effect may have seemed insignificant or transient, in the larger proportion it was very considerable, and must be attributed to the ozone rather than to the oil, since it was repeatedly manifested in patients who had taken cod-liver and other oils without any reduction, or even with an acceleration of pulse; and further, the effect on the pulse was nearly as distinct when the ozone was associated with the oil of the

cocoa-nut or of the sunflower,¹ as with that of the cod-liver. This circumstance is the more significant since the administration of sunflower oil without ozone has not appeared to me to manifest any important remedial power. The reduction of pulse in the cases described in this communication was usually observable in two or three days, and was often progressively maintained for a considerable period. A reduction of twenty beats was observed in certain cases to occur respectively in two, three, four, and six days; in other instances a reduction was noted of twenty-four pulsations in fourteen days, thirty-four in thirteen, thirty-six in twenty-two, forty in eleven. In one patient the pulse fell as low as 60, probably considerably below the natural standard, but in most of the favorable instances the reduction stopped when that standard was obtained. The apparent effect of the remedy is one which, prior to experiment, I should not have anticipated. It was not attended by any other obvious result, excepting that a general improvement of the patient's condition seemed to be associated with it.

I have used ozonized oil of turpentine in some cases of hæmoptysis with apparently prompt advantage, but have not sufficiently repeated the experiment to be entitled to express a positive opinion as regards the remedial superiority of ozonized over ordinary turpentine. Should more extended observation establish for ozonized oil the property which these records appear to indicate, it will prove a valuable addition to our remedial means;—*specially*, it may be, in consumption, which is a disease peculiarly characterised by hurried action, but not perhaps exclusively in this disorder, since there are other morbid conditions, in the treatment of which it is very important to lower the pulse without reducing power. It is true that additions to our list of medicines are not generally to be desired. If the

¹ For the careful preparation of the cocoa and sunflower oils, I am indebted to the scientific zeal and friendly aid of Mr. Fergusson Wilson.

extension of therapeutics is ever to become proportional to that of other departments of medical science, it will be by a more successful investigation of the modes of action of familiar remedies and a more precise discrimination of the conditions which should regulate their employment; and with the progress of real knowledge in this direction, the number of medicines in daily use will probably, as a consequence, be lessened. Nevertheless, the substance recommended in this communication has more than a common claim to consideration, since it is now generally regarded as an active form of oxygen, an element intimately connected with the economy of life.

Case.	Stage.	Date.	Medicine.	Pulse.		Respiration.	Weight, &c.
				Sitting.	Standing.		
J. H.	First	1855					
		Oct. 8	Salines	104	...	...	11½st.
		Oct. 10	Ozonized sunflower oil	104			
		Oct. 17	...	...	...	...	10st. 13¼lbs.
		Oct. 20	...	92			
F. C.	First	Oct. 22	...	...	...	...	11st. 0¾lbs.
		Oct. 4	Salines	...	...	...	7st. 12¼lbs.
		Oct. 10	Ozonized sunflower oil	118			
		Oct. 20	...	102			
		Oct. 24	...	86	...	...	7st. 13½lbs.
M. T.	First	Oct. 31	Simple oil				
		Nov. 3	...	108			
		Oct. 2	...	108		*	
		Oct. 6	...	...	...	...	7st. 5lbs.
		Oct. 10	Ozonized sunflower oil				
J. S.	First	Oct. 20	Ozonized coco-oleine				
		Oct. 29	...	100	...	...	7st. 5lbs.
		1856					
		Oct. 17	Salines	108 or 98 (uncertain from erasure)	...	...	10st.
		Oct. 21	5ij ozonized cod-liver oil				
W. B.	Third on right side, first on left	Oct. 25	...	88			
		Oct. 28	...	90			
		Nov. 3	3ss ozonized cod-liver oil	102	...	...	10st. 4lbs. (Venous hum in the right jugular.)
		Dec. 10	...	96			
		Oct. 30	Ozonized cod-liver oil twice a day	120	...	24	
S. H.	First on right side, third on left	Nov. 3	Ozonized cod-liver oil thrice a day	100			
		Dec. 10	...	80			
		Oct. 28	...	90	...	26	9st. 4lbs.
		Oct. 29	Ozonized cod-liver oil				
		Nov. 3	...	90			
		Nov. 8	...	90			

Case.	Stage.	Date.	Medicine.	Pulse.		Respiration.	Weight, &c.
				Sitting.	Standing.		
S. W.	First	1856					
		Oct. 22	...	...	...	...	7st. 8lbs.
		Oct. 25	Ozon. cod-liver oil	108	...	...	7st. 13lbs.
		Nov. 30	...	108	...	...	(Venous hum in the jugu- lars.)
T. W.	First	1857					
		Dec. 14	Cod-liver oil, ʒij, twice daily	...	...	26	9st. 4lbs.
		Dec. 31	...	...	...	..	9st. 6½lbs.
		1858					
		Jan. 6	Ozon. cod-liver oil	90	96		
		Jan. 19	...	64	68	20	
		Jan. 27	Simple cod-liver oil	60	64	20	9st. 5lbs.
		Feb. 3	...	68	72		
		Feb. 6	...	80	80		
D. J.	First on right side, second on left	1857					
		Sept. 22	Cod-liver oil, ʒij, twice daily	...	...	...	9st. 12lbs. (5ft. 7 in.)
		Oct. 10	...	...	...	...	9st. 6½lbs.
		Oct. 24	ʒss	...	...	...	9st. 8lbs.
		Nov. 7	...	...	...	...	9st. 11lbs.
		Dec. 4	...	...	...	...	9st. 13½lbs.
		Dec. 10	Ozon. cod-liver oil, ʒss	112	120		
		Dec. 16	...	92	100		
		Dec. 19	...	90	102	...	10st. 1½lbs.
		1858					
		Jan. 2	...	76	88	16	
		Jan. 6	Simple cod-liver oil	80	88		
		Jan. 13	Ozon. cod-liver oil	108	124		
		Jan. 15	...	88	88		
		Jan. 17	...	88	92		
		Jan. 19	...	84	92		
		Jan. 20	Simple coco-oleine				
		Jan. 26	...	88	92		
		Jan. 27	...	92	100		
		Feb. 3	Ozon. coco-oleine	92	98		
		Feb. 6	...	86	96		
T. R.	First	1857					
		Dec. 2	Potas. iod. and liq. potassæ	...	...	...	7st. 8½lbs. (5ft. 4 in.)
		Dec. 18	...	...	...	...	7st. 10lbs.
		1858					
		Jan. 8	Ozon. cod-liver oil, ʒij, twice a day	95	104		
		Jan. 13	ʒss	104	112		
		Jan. 19	...	92	104		
		Jan. 23	...	86	100	18	

Case.	Stage.	Date.	Medicine.	Pulse.		Respira- tion.	Weight, &c.
				Sitting.	Standing.		
C. T.	Third on right side, first on left	1858					
		Jan. 12	Salines	...	...	...	7st. 9½ lbs. (5 ft. 4 in.)
		Jan. 18	Tolu mixture				
		Jan. 20	...	80	86	16	(After exer- cise.)
		Jan. 23	Cod-liver oil, ʒij, twice daily	86	96		
		Jan. 27	...	92	100	20	
				104	120	20	
		Jan. 28	Ozon. coco-oleine, ʒij	92	100		
		Feb. 1	...	88	100	20	
		Feb. 3	...	80	96		
J. J.	First	1857					
		Dec. 9	Ammonia, casca- rilla, prussic acid Digitalis; aconite	...	...	...	8st. 11lb. (Ve- nous hum, arterial mur- mur.)
		1858					
		Jan. 7	Quassia, iron				
		Jan. 13	Ammonia, &c.				
		Jan. 27	Ozon. coco-oleine, ʒij, twice a day	108	122		
		Jan. 29	...	104	120		
		Feb. 2	...	88	96		
		Feb. 6	...	112	128		