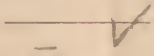


*Draper*



# PNEUMONIA AND OZONE.



*Compliments of*

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Since the beginning of this year there has been a severe and very fatal epidemic of pneumonia in this city, from which many of our most eminent citizens have died. Several of the leading physicians have stated that the deathrate from pneumonia this year has been much larger than that of the cholera in the year 1854.

As so much solicitude has been felt and expressed by the doctors and by the public at this sudden increase of death from pneumonia, I have thought that it was desirable to undertake a systematic study of the bearing of meteorology upon it, and see if there could be detected any connection between the weather and this disease in the city of New York. On comparing many thousands of observations from the self-recording barometer, thermometers (dry, wet, and sun), hygrometer, anemometers, and pluviometer, with the mortuary statistics, there could not be found any continuous connection between these observations and the prevalence of pneumonia. But when ozone was taken into consideration, there was found to be a very close connection between its observations and the deathrate from this disease.

In the following table is given a summary of the deaths from pneumonia, the amount of ozone, and the number of days on which ozone occurred for the months of January, February,

March, April and May for each year from 1878 to 1885 for the city of New York:

YEARS.	DEATHS.	OZONE.	NO. OF DAYS.
1878	1304	9.50	73
1879	1409	10.88	65
1880	1490	12.39	75
1881	1804	12.84	101
1882	2056	16.19	86
1883	2061	12.73	85
1884	1608	6.45	48
1885	2308	13.26	87

On an inspection of this table, it will be found that by the records of the Health Department of New York City there were for the first five months in the year 1878, 1304 deaths from pneumonia, while the observations at this observatory give 9.50 for ozone on 73 days for the same months. In 1882 the deathrate had increased to 2056 deaths, and the ozone to 16.19 on 86 days. In 1884 there was a decrease in the deathrate to 1608, and also in the ozone to 6.45 on 48 days. In 1885 the deathrate from pneumonia increased to 2308; the ozone had also increased to 13.26 on 87 days.

Having studied the observations thus far, the two following questions appeal to our attention.

- (1) *What is ozone?* (2) *Can ozone produce pneumonia?*

For more than half a century scientists have been endeavoring to answer the first question. Some of them have called it "electricized oxygen," "allotropic oxygen," "active oxygen," "excited oxygen." Berzelius expressed the opinion that ozone was oxygen in a peculiar state. Becquerel demonstrated that oxygen may be converted into ozone by the prolonged action of electricity. By a majority of modern experimenters it has been admitted that ozone is an allotropic condition of oxygen, similar to that which may be assumed by chlorine, as was shown by my father the late Prof. John William Draper, M. D., of the New York University, and an account of which was published by him in a memoir entitled, "*Allotropism of Chlorine, or its passive and active states,*" in

the year 1845. Ozone like chlorine possesses powerful bleaching, disinfecting, and deodorizing qualities, and in a concentrated form both these gases are very destructive to animal life. According to Schönbein, oxygen is capable of assuming three different conditions, viz:—two contrary active states, and one passive. These have been named respectively ozone, antozone, and neutral oxygen. But why oxygen should assume its active or passive states little is known. My father found that the indigo rays of the solar spectrum could produce in chlorine the active condition. May not these same rays produce the corresponding state in oxygen?

In taking daily observations on ozone at this observatory, Schönbein's iodide of potassium and starch papers have been used, and also the iodide of calcium and starch papers. I have noticed that on some occasions, soon after the papers have been exposed to the atmosphere they change to a decided brown color, while after a few hours this brown color nearly disappears. On dipping the paper while still brown into water, the blue color of iodide of starch is given. This shows that antozone has been present in the atmosphere but has not had time to destroy entirely the ozone effects produced on the paper.

We come now to the consideration of the 2nd question, viz:

*Can ozone produce pneumonia?*

As to the causes of this disease, very little is known. Sometimes no cause at all can be traced. Very often it is supposed to be the consequence of exposure to cold, especially when the body has been previously heated by exercise. But why such exposure should in one person cause pneumonia, in a second, pleurisy, in a third pericarditis, and in a fourth, peritonitis we cannot tell.

If, as we have seen in considering the first question, oxygen has the power of assuming different forms, one of them preservative, another destructive, may it not in one or other of these forms produce inflammation of the substance of the lungs, etc., thereby causing their engorgement with blood not properly arterIALIZED? I think it might be well for physicians in their treatment of pneumonia, or its allied diseases to consider whether these diseases may not be due to ozone or antozone, and whether it may not be

possible to neutralize the evil effects of one form of oxygen, by the use of the other. The further question arises whether the administration of pure oxygen to patients may not be the very worst treatment. It is well known that the oxygen of the atmosphere is mixed with about four-fifths of nitrogen.

I regret to see that so many meteorologists neglect the taking of ozone observations, because they are not satisfied with the results obtained. I think that the day is not far distant when we shall know the exact influence of ozone upon disease, and if it should be discovered that in other cities, there is the same connection between ozone and the deathrate from pneumonia, and its allied diseases, as there seems to have been in this city for the past eight years, shall we not have made the first necessary step towards mitigating the evil results of this disease upon human life, as well as its disastrous effect upon cattle under the form of pleuro-pneumonia.