BLUE SUN: A COLLOIDAL EXPLANATION

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During a severe duststorm at Dallas, Texas, on March 17, 1935, the disk of the sun appeared deep blue in color. The dust of the storm was composed largely of small grains of quartz, floating in the atmosphere at a great height, perhaps 12,000 feet or more. Reports from the Dallas Airport Station indicated that the duststorms that came during the spring of 1935 often reached this height, and at times the ceiling was 13,500 feet. In western Texas and Oklahoma, these duststorms frequently produced high potential electrical charges in the atmosphere, causing sparks to be drawn from metal parts of cars and other metallic bodies.[1]

It is a well known fact that ozone, a blue colored gas found in the upper atmosphere, may be produced by electrical discharges through the air. The writer believes that the blue color of the disk of the sun, as seen on the above date, was due to an excess of ozone produced by high potential discharges incident to the duststorm. In the table below will be found a partial report of the weather on the above date. The weather data were obtained from the Dallas Airport Station.

Afternoon of March 17, 1935

Time	visibility	wind-vel.	wind dir.	dewpoint	temperature
3 p.m.	1.5 miles	22 m.p.h.	SE	42°F	62°F
7 p.m.	2.0 miles	24 m.p.h.	SE	26°F	36°F

In any colloidal suspension there exists at the interface a difference in electrical potential.[2] This potential difference indicates the two phases have a different density of electrostatic charge, one positive and the other negative.

It has been observed that an undamped electrostatic voltmeter of very short period, if connected to an aerial during

[1]George, E. F., Young, W. M., and Hill, H.: "Remarkable Electrical Conditions Accompanying West Texas Sandstorms", *Physical Review*, Vol. 30, (1927) p. 362 (abstract).

[2]Ware, J. C., *The Chemistry of the Colloidal State*, first edition, 1930.

a sandstorm, is set into vigorous vibration indicating a rapidly fluctuating potential of more than 20,000 volts. The current produced, when measured by grounding through a galvanometer, showed 20 micro-amperes. Triboelectricity has been advanced as an explanation, however, on still days when there is suspended a great amount of dust, the aerial potential may fluctuate between 5,000 and 10,000 volts. In a similar method to that previously mentioned, 1 micro-ampere current was shown.[3] There will be a Browian movement[4] of the suspended colloidal dust particles on still days. This movement between the two phases, as well as precipitation currents arising from heavier particles,[5] would give rise to a second potential.[6] Such high potentials, which would vary with the quality as well as the quantity of the suspended matter, would be capable of ionizing the oxygen and producing ozone.

In the table given above, the visibility increased from 1.5 to 2 miles in 4 hours. One might suppose the larger particles with their correspondingly greater refractive and reflective surfaces were rapidly precipitating, leaving a more unobstructed passage for the shorter wavelengths of light. The rapidity would be due to the heavy weight per unit volume since the suspended material was quartz. The Dorn effect, which is the migration potential set up by the particles moving through a fluid, would be emphasized by the increased velocity of the wind. The fall in temperature would aid in preserving the unstable ozone formed.

Upon the foregoing information the author bases his theory of ozone formation as a result of the electrical potential developed by suspended colloidal particles during a duststorm. In using the word "colloidal" the author has not attempted to determine a dimensional criterion.

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[3]Benade, J. M., "Atmospheric Electricity during Sandstorms" *Science,* new series, Vol. 70 (1929) pp. 379-380.

Cranfield, R. H., "Atmospheric Electricity during Sandstorms" *Science,* new series, Vol. 69 (1929), pp. 474-475.

[4]*Phil. Mag.,* 4, 161 (1828); 6, 161 (1829).

[5]Humphreys, W. J., "Physics of the Air", sec. ed. page 389.

[6]Ware, J. C., Op. cit. p. 150.