It would seem as though our views as to the condensation of these fog-particles, and consequent liberation of latent heat, must be very much modified. We are told that moist air, say, at 99 per cent relative humidity, has different properties from saturated air at 100 per cent. The first, by theory, has a diminution in temperature of one degree in 188 feet vertical height; while the second, at 80°, has a diminution of one degree in 500 feet. It does not seem possible for such enormous differences to exist in two masses of moist air so near alike. It is supposed that dry air has a capacity for molecules of vapor without change of volume, and dependent entirely upon the temperature. For example: a cubic foot of dry air weighs, at sea-level, 566 grams; the same saturated will weigh 571 grams at 56°, and 576 grams at 77°. If it weighs 571 grams at 77°, we say it is half saturated. It would seem as though the arrangement of the molecules must be precisely the same in the latter case as when the humidity is 99.9 per cent or 100 per cent, except that they are in a condition, in the moister air, to unite more readily. It would be a great stretch of the imagination to consider that there is any marked difference in the condition of the molecules at 99.9 per cent and at 100 per cent.

Suppose we cool saturated air very slightly: all the molecules cannot remain as vapor, but some of them coalesce, as do globules of mercury when they touch each other. It would seem probable that if, as many admit, rain is simply the coalescing of a very great number of minute cloud-particles, we may extend the same action a step farther back, and consider that the original molecules also mechanically coalesce without setting free any latent heat. If this be so, there certainly is not needed any dust-particle as a nucleus for the mingling. We have now our air still saturated with vapor, and at the same time full of, say, double molecules of vapor. If we cool still more, the double molecules add others to themselves, and we finally have our fog or fog-particles floating in saturated air.

It has been thought that these particles (spheres) are kept in suspension very much as dust is, but this hypothesis seems untenable. Others have considered that each sphere is electrified, and repels every other sphere; and there is some color to this from the fact that a vivid flash of lightning overhead is often followed by a heavy and sudden downpour of rain. It seems probable that we can extend this hypothesis still farther back, and regard each molecule as electrified. May not the coalescing of these molecules be dependent upon their electrical state as much as or even more than upon their cooling? The principal point to be borne in mind is, however, that the formation of fog and cloud is a purely mechanical process, unaccompanied by the evolution of heat. A striking proof of this was observed during an ascent of Greylock, in Massachusetts, on Dec. 15, 1883. At the summit the wind was blowing a whole gale, and the temperature was −7°, with the air saturated but perfectly clear. In a few minutes there were just barely perceptible little white particles upon the overcoat. In a very short time the aggregation of particles, absolutely invisible to the eye, had become completely white. On the trees the particles had massed nearly an inch thick. Another proof of this mechanical aggregation is found in making observations with Regnault's dew-point apparatus. It would be supposed that as the dew-point is reached there would be a uniform deposit of molecules upon the plate; but this is not the case, as there are spaces between the dew-particles. The effect is most noticeable when hoar-frost is beautifully deposited in very marked lumps, at temperatures below freezing.

The cause of fog seems briefly as follows: 1. It is essential that there be no wind. I do not mean that the wind does not blow the fog after it is formed, but there must be little or none while it is forming. 2. The sky must be clear. We often notice a cloudless sky after a fog is dissipated. On weather-maps, "fog" is entered as "fair," for, though not a particle of sky is visible, yet it is almost a certainty that the sky is clear. 3. The air must be saturated, or nearly so. It is very surprising how rarely the last condition occurs at inland stations. A relative humidity of 95 per cent has been noted in the air, in which rain is falling, and had been falling continuously for seventeen hours. This condition almost always can occur only to the south, south-east, or north-east of a storm. At nightfall, whenever these conditions combine, there is a rapid radiation from the earth to the sky, which speedily supersaturates the overlying air; and, after that, radiation from the upper surface of the fog continues the process, and extends the fog upward until the action ceases with the rising of the sun. H. A. HAZEN.

Washington, D.C., May 24.

Publications received at Editor's Office, May 13-25.

BACIGALUPI, E. G. Immunity through Leucomaines. Tr. by R. F. Rafael, M.D. New York, J. H. Vail & Co. 170 p. 12°.

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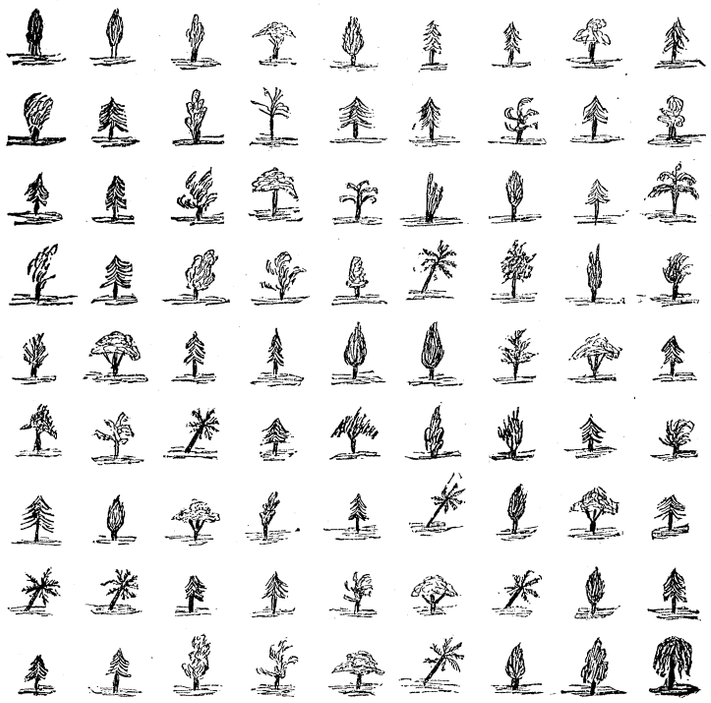

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