DISCUSSION

THE FALLING OF THE DEW

THE problem of the "falling" of dew has long been one concerning which there are many men of many minds, and their confusion is still confounded, as evidenced by several recent articles about it in *Nature*. One group, esthetic and poetical, says that dew falls, and says it in language often so beautiful that it would be all but sacrilege to question its truth. Another group, looking at the other side of the shield, or, literally, the underside of the leaf, insists that it rises. A third, and pacifist group, urges that both are right, that dew rises and dew falls. This leaves room for only the iconoclast, and that room is taken, for there are those who are emphatic in their statements that it neither rises nor falls. Well, as usual, they are all right and all wrong—each right according to his own definitions of the terms used, and wrong according to the other fellow's definitions.

According to my understanding, all dew is liquid water, except, of course, mountain dew, if any one insists on being so meticulous. Furthermore, it is that particular liquid water that has condensed onto relatively cold objects (objects whose temperatures are below the current saturation or dew point) from immediately adjacent water vapor. According to this definition dew, a mass of liquid water, does not fall. That would be rain, drizzle or the settling of fog or haze—the descent of water-drops. But even so we can speak of the falling of the dew in the same correct sense that we speak of the falling of the night, that is, in the sense of gathering as if by falling, or merely in the sense of occurring. And this, I believe, is what most of us, poets and all, mean when we speak of the falling of the dew—merely that it is forming or gathering.

However, one may insist, and some do so insist, that even if dew is formed by the condensation of water vapor, the vapor molecules had to get to the place of condensation by motion in some direction—down, up or sidewise. If the air is still, and if the top of an object is bedewed (a very common occurrence) we doubtless would be right in insisting that the final travel of the vapor was downward, wherever it originally started from and however tortuous its intervening path. In this sense, the sense of final course of the vapor molecules that go to make it, some dew does fall—does go down—not owing to gravitation, but to difference in vapor pressure, a pressure that is least at the place of condensation where the vapor is continuously disappearing or flowing away as if into a sink. In exactly this same sense the dew on the underside of an object, a leaf, for instance, has risen.

Many of the "dewdrops" on the tips of grass and other growing vegetation have not been produced by condensation at all, but by exudation—the flow of water up the leaf and out at its tip or tips. This false dew has, in general, risen. Also it may happen that the absolute humidity (quantity or mass of water vapor per unit volume) immediately over a bedewed lawn, say, is quite as great during the formation of the dew as it was immediately before, owing to an abundant supply of vapor from the damp sod beneath. In this case it may be said that all the dew has risen, the dew on the upper side as well as that on the under side of each and every object.

If, therefore, we adequately prepare the way by definitions appropriate to our needs, we can correctly say that dew falls (in either of two senses), rises, does both or does neither.

How then about frost—is that frozen dew? Dew in the sense above used, liquid water condensed from vapor, freezes whenever, after it has formed, the temperature falls sufficiently low, whereupon it becomes a kind of frost, but not the fine, white, feathery sort known as hoar frost. This latter variety, by far the more common, is formed by the direct condensation of water vapor into ice. It does not pass through the liquid state, hence never was dew and therefore is not frozen dew, as dew is here defined.

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RETREAT OF CAVELL GLACIER

A NOTEWORTHY instance of the retreat of a valley glacier was confirmed by the Princeton International Summer School of Geology and Natural Resources during the past summer. Two years ago Dr. E. M. Kindle, of the Canadian Geological Survey, established a datum point and line of measurement to the foot of Cavell Glacier, on the north side of Mount Edith Cavell in Jasper Park, Alberta. On July 17, 1927, the measurement made by Dr. Kindle from the datum point to the ice front was 322 feet 6 inches. About a month later, on August 22, the distance had increased to 342 feet, showing a retreat of 19 feet 6 inches in 35 days. At this time, the glacier was visited by the 1927 party of the Princeton Summer School, in company with Dr. R. M. Field, Mr. E. B. Bailey, Dr. L. A. Collet and Dr. Kindle, and several general observations were made. On July 26, 1929, the glacier was revisited and measured by the writer and other members of the Princeton party. The distance from datum point to ice front had increased to 415 feet. This indicates a retreat of 92 feet 6 inches in two years.[1]

The direct evidence of retreat is supported by other observations showing changes in the surface features

[1] For photographs of this glacier see "The Geological Story of Jasper Park," by E. M. Kindle, pp. 38–40, 1929, National Parks of Canada, Department of Interior, Ottawa.

of the glacier in 1929, as compared with 1927. In the latter year, a transverse ridge of debris, formerly crevasse filling, was exposed on the ice a few yards back of the ice foot; this ridge, in 1929, is twenty feet or more in front of the ice. The ice near the foot of the glacier seems much more laden with debris than was the case two years ago and there has apparently been a considerable shrinkage in the thickness of the glacier, which has left a residue of numerous rock fragments exposed on the ice surface. No moraine is visible near the line occupied by the ice front in 1927, and this would indicate that the retreat has been continuous and gradual for more than two years. Most of the new deposits have been left as scattered ground moraine, extensively reworked by outwash from subglacial streams.

Since the lower glacier is comparatively small, the figures and other data lead to some speculation concerning its future condition. This is of especial moment since an automobile highway for the convenience of sightseeing has been recently completed to the glacier, at a considerable cost.

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OUTCROP VS. EXPOSURE

IN geologic descriptions of rock units, it is generally convenient if not necessary to distinguish between areas in which a particular formation directly underlies the surface of the ground and those specific points where the formation is visible at the surface as in a ledge. In the majority of stratigraphic descriptions, the terms "exposure" and "outcrop" are used interchangeably for either of the above conditions with the result that the exact meaning of a phrase is often obscure. For example: "This exposure of the shale is directly south of the outcrop of the limestone"; "Cleavage occurs throughout the exposure"; "The main road passes near an exposure of the limestone." Without additional qualifying phrases, it is not at all clear in these sentences whether the term "exposure" refers to a specific visible *exposure* of the rock, or merely to a belt where the formation is the surface bed-rock. Such difficulty of expression can readily be avoided by attaching a definite meaning to each of the terms in question. It would seem to be a decided convenience if geologic authors would consistently use the term "exposure" for points where a particular formation is exposed to view, and would restrict the term "outcrop" to those areas where the formation makes up the bed-rock directly below the surface of the ground. One would thus describe such points as ledges, road-cuts and other bare rock surfaces as exposures, while the area or surface extension of the formation would be described as its outcrop. This restriction of meaning is entirely in accord with the etymology of the two words and should be simple to put into practice. Its use should avoid many ambiguous phrases.

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ON NEW LAWS FOR THE SOLAR SYSTEM

MY attention has been drawn to an interesting article by Dr. W. M. Malisoff appearing in the issue of SCIENCE for October 4. Reference is made to a law proposed by me, and since his first paragraph may be somewhat misleading I am taking the liberty of clarifying the situation.

It is obvious that the percentage deviations given in my original article refer to the integers and not the *squares* of the integers (the italics are his). This is no correction but a variation in statement. In his section (4) Dr. Malisoff has done precisely the same thing that he condemns in his section (2). Both the laws he states in his sections (4) and (5) follow directly from the law stated by me coupled with Kepler's laws or the law of gravitation, and are subject to the same discrepancies.

Sections (6) and (7) are interesting, and one could wish that the author had given numerical data in support of the laws stated therein.

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CONTINUED GROWTH OF AMERICAN CHESTNUT

THOSE who have followed progress of the chestnut blight may be interested to learn that the grove of trees earlier reported[1] still continues vigorous growth. This grove, located on Chester stony loam in the Piedmont just west of the coastal plain, consists of old trees of twelve to sixteen inches diameter breast high. The trees were earlier blighted and most of the crowns were killed but they have partially replaced the crowns. New growth is distorted by cankers which do not, however, seem to impede development; each year some twigs and branches are blighted but per cent. of killed tissue is small compared with new production. Although most species of nut trees are virtually devoid of fruit this year (1929), the chestnut trees bore a fair crop. On visiting the grove on September 19 the writer found the ground littered with burs thrown down by a squirrel; the burs contained one to three plump nuts, a proportion of which were parasitized as in earlier years by a larva, possibly that of the nut-weevil *Balanius caryatrypes*.

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[1] A. P. Kelley, "Conservation of Our Native Chestnut," SCIENCE, n.s., 63: 476–477, 1926.