the centre indicated by four photographic determinations of the radiant, the relative places being :—

	Radiant Point
From eye observations	149°·7+22°·7
From photographic trails	151°·5+22°·2.

Though there are now some hundreds of eye-estimated radiant points of this shower available for comparison, the resulting average place is not likely to be as accurate as the few positions obtained by photography. But even the centres derived from the latter method do not exhibit absolute agreement, the difference amounting to more than one degree in two of the cases.

It is hoped that the shower will be specially looked for on the mornings of November 15 and 16 if the atmosphere is favourable. W. F. DENNING.

Leaf Decay and Autumn Tints.

THE leaves of our forest trees at the period of the autumnal fall are not similar as respects the condition of vitality which they then have reached; that is to say, while some still retain their green colour and drop off, as it were, mechanically, the majority exhibit a change of coloration and are apparently dead or more or less decayed. The relation between these stages of vitality or decay and that of the particular colour (red, yellow, or brown) which the autumn leaves assume may be so far demonstrated by a critical scrutiny of certain constituents of the mineral matters (ash), especially the silica and lime, which they enclose at the very moment when this special and characteristic colour is displayed. In order to present to view this order of thought, the following tables of ash analyses are drawn up, the percentages being calculated on the red, yellow, or brown leaves with their petioles dried at 100° C., and on the ash minus charcoal :—

Leaves which become Red in Autumn.

	Percentage of ash	Constituents of the ash	
		SiO_2	CaO
Norway Maple	10·5	8·7	44
Wild Cherry	7·3	3·3	35·3
Rowan	8·6	3·4	41·4
Scarlet Oak (*Quercus coccinea*)	4·8	3	51
Dogwood	11·3	9·3	45·5
Elder	13·7	4·5	29·9

Leaves which become Yellow or Brown in Autumn.

	Percentage of ash	Constituents of the ash.	
		SiO_2	CaO
Wych Elm	16·8	28·8	40·8
Sycamore	12·1	20·7	41·9
Oak (*Quercus robur*)	6·35	13	44
Beech	6·3	23	32·6
Larch	4·6	19·4	27
Weeping Willow	10·3	10·9	37·5
Poplar	9·7	23	35·2
Hornbeam	12·5	42·2	24·4
Linden	8·9	22·2	35

Assuming that a heavy ratio of total ash and of silica therein is an indication that the life of the leaf is practically exhausted and its physiological energy at an end, we may, in view of the foregoing tables, consider two cases :—(1) where the percentage of silica is under 10 per cent., and (2) where the percentage of silica is 10 per cent. or more. It will be at once observed that every one of the leaves which turn red in autumn belong to the former category, while all those exhibiting yellow or brown tints and shades belong to the latter. This state of affairs would seem to hold good universally, provided only that the other conditions of the phenomena are equal. Hence a few other examples, such as the birch, the leaf of which, generally yellow, is occasionally dashed with red, or the ash-tree, the leaf of which has a small percentage of silica but a high percentage of ash, are omitted from the lists. Once upon a time I found some hazel leaves, which were almost as red as those of a wild cherry, to contain only about 9 per cent. of silica in the ash (whereas, according to De Saussure, it holds even as early as September 20, 22 per cent. silica). With regard to the exceptional instance of the yellow and never red ash-tree leaf, every plant analyst is aware how prone its tannic chromogen is to be, in certain circumstances, the precursor of a very dark brown shade, such as no other tree of our woodlands (except, perhaps, the holly) ever approaches. Eminently interesting and instructive is the contrast shown in the tables between the two maples as well as between the scarlet oak (*Quercus coccinea*), the magnificently tinted denizen of the American forest, and our own British oak (*Q. robur*), yellow and russet in autumn. It is known that the leaves of American maples, &c., cultivated in Europe do not exhibit such marked changes of colour, *i.e.* to rich deep scarlet, orange scarlet, deep rich purple, rich orange, dark crimson, &c., as they do in their own country. The causes of this difference are now pretty much made manifest. The soft, mild and yet glowing climatic conditions of the American woodlands sustain the vitality of the deciduous leaf to a degree not possible with us; we are rarely blessed with an Indian summer in the fall. The mineral matters flowing to the dying leaf flow in a quantity directly proportionate to the decay of its vitality. There is a drainage of substances (especially of silica) from the living portions of the arboreal organism to the dead and dying parts thereof. In such of our leaves as can resist the rigorous climatic severity, their vitality is so far sustained that the normal process of de-assimilation (the development of coloured pigment from tannic chromogen) is not impeded, though never so complete and splendid as in the glorious forests of New England.

Patterdale, Westmorland. P. Q. KEEGAN.

Variation of Atmospheric Absorption.

WITH regard to Prof. Langley's letter on the abnormal atmospheric absorption (p. 5) some observations of a different nature may be of interest.

Both this year and last I was photographing in Switzerland, using a Wynne meter for timing my exposures. In 1902 I found that the time required to darken the sensitive paper on a sunny day, at an elevation of 11,000 feet, was one second. This year the time, under exactly similar conditions, and using the same batch of paper, was three seconds. That the difference was not due to the paper being stale is shown by the negatives being equally good in the two cases.

The maximum sensitiveness of the paper is for blue light; yellow and orange do not affect it; it was exposed under a glass plate about 3 mm. thick. J. TALBOT.

Harrow-on-the-Hill, November 7.

Rocket Lightning.

MR. J. EWEN DAVIDSON (98 Banbury Road, Oxford) has directed my attention to his letter in NATURE, vol. xlvii. p. 582, describing auroral appearances associated with a thunderstorm witnessed by him in Queensland, of which he was reminded by the letters headed "Rocket Lightning" in your issue of October 22, p. 599. Comparison of the two accounts is interesting, but the phenomena appear to me not to have been identical. Mr. Davidson says what struck him most in the recent account was the description of a misty cloud above the low bank of thick cloud. In his own case there was a very thin misty condensation over the thunderstorm, extending to an altitude of 40° or 45°, and "the rosy light phenomenon and the streamers only shot up to the upper edge of this misty condensation." He says, "I did not mention the misty condensation in my letter to NATURE, as I did not then connect the two, but thought it was a mere coincidence, the one slightly veiling the other; but that there is a connection is now evident." "Both observers were practically looking upon the upper edge of a thunderstorm at a distance, and in both cases there was the misty appearance above it, with the comparatively slow upward moving light phenomena." J. D. EVERETT.

11 Leopold Road, Ealing, W., October 29.