radius r of the cloud drops from the angular radius of a ring, a divergence from theory was found on this, and other, occasions. Theoretically all the rings should give the same value for r, but the calculated value of r was found to diminish with the order of the ring outwards.

The Japanese observers are stated in the note to attribute the halo to reflected light from sun-images formed on the green blades by rays refracted through dewdrops. In the case of the cloud observations it seems necessary to assume reflection from portions of the cloud itself.

The difficult point, however, is to explain why the light thus reflected should be maximum in the direction of the sun, or, what is the same thing, in the direction of the observer. The fact that the ring surrounds the shadow of the observer's head seems to render such an assumption necessary. A single drop, as Prof. Richarz points out, does not give maximum intensity of reflection in the direction of the incident light. Dr. Richarz's explanation why the cloud as a whole should do so is simple and ingenious, and is applicable whether the sun's rays fall normally or obliquely to the surface of the cloud. Direct light only penetrates into the cloud (or assemblage of drops) when it finds a clear path, for if it strikes any drops on the way it will be scattered or diverted by refraction and reflection at their walls. If light which has so penetrated should then fall on the surface of a drop in the interior, it will be reflected in various directions, but only that portion of the reflected beam which returns the same way it came can find a clear path out again. Portions of the beam reflected in other directions will generally find their way blocked by intervening drops and be scattered. Hence the intensity of the reflected light will be maximum in the direction of the source of light, and the intensity will fall off rapidly with departure from that direction. The observer's head (or the balloon) cuts off the central portion of the sheaf of rays which he would see most brightly reflected, leaving only the peripheral portion visible.

To digress, I have a vivid recollection of one very foggy winter evening when I was wintering in a cottage on a wild part of the Cornish coast. Chancing to throw open the casement window of the sitting-room, I was for the moment quite taken aback to find myself confronted by a tall sinister figure looming up before the window. It was my own shadow thrown on the fog by a lamp left unshaded on a table in the room.

Perhaps I may take this opportunity to record another little optical observation of different character. Once—I think it was towards the close of the hot summer of 1908—watching, from the top of a cliff some 800 ft. high, the sun setting over the sea, I saw the upper half of the disc look like a double staircase; there were three or four distinct, almost rectangular, steps cut out of the limb symmetrically on either side. When most of the disc had sunk out of sight, the small portion remaining was suggestive of the lid of a teapot with a knob on top. Some lines of light cloud about the horizon showed the existence of horizontal stratification in the atmosphere, and the strange distortion of the solar limb was evidently due to refraction through horizontal strata with extraordinary sharpness of boundary and difference of density. ALICE EVERETT.

Milbourne Lane, Esher, January 6.

"Rosa stellata."

IN 1898 Prof. E. O. Wooton described a remarkable new rose from southern New Mexico, giving it the name *Rosa stellata* on account of the stellate trichomes. The peculiar, mostly trifoliolate leaves, the leaflets with cuneiform bases and more or less truncate, sharply toothed apices, gave the plant an unusual appearance; while even the flowers, described as "large and showy . . . deep rose-purple," were not at all like those of the ordinary wild roses of the Rocky Mountains. Through the kindness of my friend, Prof. Fabian Garcia, I obtained some living plants of *R. stellata* from the original locality in the Organ Mountains. Some of these were sent to Dr. A. R. Wallace, who has grown them in England successfully; the others have been growing in Boulder, Colorado. Last year the plants in my garden grew exceedingly well, and were most attractive. Certainly if *R. stellata* can be generally used in gardens, it will be a valuable addition to horticulture, but it probably will do its best only in relatively dry climates. My wife attempted crosses with several other roses, and in one case was successful in getting good seed; what will result remains to be seen.

The fruit of *R. stellata*, as indicated by Wooton, is large, beset with strong slender prickles. Quite unlike the usual types of rose fruits, its walls are dense, not at all fleshy or brilliantly coloured, but corkv. The orifice is very broad, with a diameter of 8 mm. The bright chestnut-red seeds, about 4 mm. long, are long-oval, not compressed, and therefore not at all angular. All this differs conspicuously from the fruit of typical Rosa.

R. stellata, however, is not the only plant of this type. Years before, Engelmann described *R. minutifolia* from Lower California, a plant with the same general characters. In recent times, Dr. Greene has separated part of Wooton's *R. stellata* as *R. mirifica*, and has added a fourth species, *R. vernonii*. Thus we have a compact group, which should, I think, form a distinct subgenus or genus Hesperhodos, with *stellata* as the type. All the species are of extremely restricted distribution, which may probably be explained by the fact that the fruits are not adapted to be eaten by birds.

The wide-open prickly fruit suggests that this may be a primitive form, as compared with true Rosa; but it is to be noted that the roses found fossil in the Miocene beds of Florissant, Colorado, belong to the true genus Rosa, not at all to Hesperhodos.

T. D. A. COCKERELL.

Boulder, Colorado, December 30, 1912.

A Lens or a Burning Glass?

IN the latest edition of Carpenter on the microscope at p. 119 occurs the following, evidently from the pen of the late Dr. Dallinger:—"There is in the British Museum a remarkable piece of rock crystal, which is oval in shape and ground to a plano-convex form, which was found by Mr. Layard during the excavations of Sargon's Palace at Nimroud, and which Sir David Brewster believed was a lens designed for the purpose of magnifying. If this could be established it would, of course, be of great interest, for it has been found possible to fix the date of its production with great probability as not later than 721–705 B.C. . . . we spent some hours in the careful examination of this piece of worked rock crystal, which, by the courtesy of the officials, we were permitted to photograph in various positions, and we are convinced that its lenticular character as a dioptric instrument cannot be made out. There are cloudy striæ in it, which would prove fatal for optical purposes, but would be even sought for if it had been intended as a decorative boss; while the grinding of the 'convex' surface is