Letters to the Editor

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NOTES ON POINTS IN SOME OF THIS WEEK'S LETTERS APPEAR ON P. 765.

CORRESPONDENTS ARE INVITED TO ATTACH SIMILAR SUMMARIES TO THEIR COMMUNICATIONS.

The Green Flash at Sunset

OBSERVATIONS of the green flash have frequently been recorded in NATURE, and Lord Rayleigh[1], by simple and beautiful experiments with an artificial source of light and a prism the dispersion of which was equal to atmospheric dispersion, has imitated the chief phenomena of the coloured flash observed at sunset. This experimental imitation strongly supported the generally accepted view that the green flash is primarily due to atmospheric refraction, dispersion and differential scattering. The discussion following Lord Rayleigh's paper read before the Physical Society indicated, however, that before a satisfactory explanation of all the observed phenomena could be given, further observations were required.

The phenomenon is probably by no means so infrequent as is generally supposed, and may even be the rule rather than the exception when the horizon is clear and the observer at a sufficient altitude. The rarity of the green flash at sea-level is possibly due to the horizon being too near for the dispersion to be perceptible.

Recently I had an opportunity of making a number of observations of the coloured flash on the west coast a few miles north of Auckland from a hill about 180 feet high. On one occasion Mr. H. B. Lusk, who had observed the green flash with me from the hill on the two previous evenings, was on the beach at sunset and reported that no green flash was visible, though it was clearly seen by me and by other observers from the hill.

On several occasions I observed the setting sun with an $\times 30$ army pattern telescope. One evening there was obvious stratification of the atmosphere. At the moment before sunset the sun appeared orange-red through the lowest stratum, which was about a third of the diameter of the sun in thickness, orange through a second stratum of about the same thickness and light yellow above. The marked turbulence of the rim of the sun appeared to have a horizontal tendency. When about a fifth of the diameter of the sun remained above the horizon, the sun appeared orange through the telescope and the turbulent rim was fringed with green, which became more evident as the sun sank. Just before the sun disappeared, a small narrow horizontal strip appeared to become detached from the top of the sun. During detachment the ends and upper edge of this fragment were green. The green rapidly invaded the strip, which at the moment of detachment was completely grass green in colour, the much larger mass of the remaining sun appearing orange. As the sun disappeared below the horizon, the last narrow edge turned bright green before disappearing.

On another occasion when the sky was unusually clear, the setting sun was almost too bright to observe with the naked eye. Through the telescope it appeared yellow with the lower part tending to orange. When the sun had set to about four-fifths of its diameter, the turbulent edge of the sun appeared to have a narrow fringe of brilliant violet. As the sun set, this changed gradually to a bright spectrum blue. A small fragment became detached as in the previous case, but instead of being green was a brilliant blue at the moment of separation. The last tiny portion of the sun to disappear became bright blue-green before sinking below the horizon.

Although the primary cause of the coloured flash may be atmospheric dispersion, simultaneous colour contrast may very considerably modify the subjective colour effect. I had the privilege of seeing Dr. J. S. Haldane's experiments referred to by Lord Rayleigh and have seen other remarkable simultaneous colour contrast effects. Some years ago in Auckland the nearly full moon shortly after sunset appeared grass green. I telephoned to a neighbour asking him to look at the moon and tell me its colour, and was not a little relieved when he reported that it was green. I concluded at the time that the effect was due to colour contrast, the sky being highly coloured. In the case of the setting sun, the contrast is between the coloured edges or fragments and the more luminous remainder of the sun, not the background.

F. P. WORLEY.

Auckland University College,
Auckland, N.Z.
March 1.

[1] *Proc. Roy. Soc.*, A, **126**, 311; 1930. *Proc. Phys. Soc.*, **46**, 487; 1934.

I HAVE read Prof. Worley's letter with interest, and can agree with him that the green flash is by no means a rare phenomenon. On a recent trip to the West Indies, I saw it three times out of a total of five sunsets observed, using a field glass $\times 7$. It was just about as conspicuous as the experimental work would lead one to anticipate. Circumstances unfortunately prevented my observing further sunsets, as had been hoped.

RAYLEIGH.

Terling Place, Chelmsford.
April 5.

Striated Muscles of an Amber Insect

IT is well known that arthropods found in Baltic amber are unusually well preserved, so that even the minutest features of their chitinous structures are plainly visible under considerable magnification. The internal organs, however, are usually completely disintegrated, nothing but the amber mould of the chitinous skeleton remaining. It was therefore something of a pleasant surprise to discover a specimen of an amber fungus-gnat in which the flexor and extensor muscles of the tibia, located in the femur, are so well preserved in all legs, that not only their outlines, but also the transverse striations of the