nose gently against his arm, after which he walked off with a great sigh of relief.

A story somewhat analogous to the foregoing was told me by a friend, whose uncle, an old country squire in one of our western counties, had a favourite hunter in a loose box in the stable. One warm summer day he was "athirst," and could get no water. He tried to draw the groom's attention to the fact, but without success. The horse was not to be discouraged; he evidently gave the matter consideration. The thirst was pressing. All at once he remembered that he always had a certain halter put upon his head when led to the water. He knew where it hung. He managed to unhook it from its peg, and *carried it to the groom!* who at once, in great admiration of the knowledgable brute, rewarded him in the manner he desired.

M. CAREY-HOBSON

Colour-Blindness

DR. PRIOR'S letter is almost entirely philological, and therefore does not come within my province. I have alluded to the colour-blind impression of white in my paper in the *Phil. Trans.*

I should like to know more about the eyesight of the person who says he cannot distinguish snow.

The latter part of the first paragraph of my letter on p. 120 should run, "In pigments, neutral green appears to me gray."

December 14 W. POLE

Magnetic Storm, May 14, 1878

REFERRING to a letter from the Rev. S. J. Perry in NATURE, vol. xviii. p. 617, reporting the magnetic disturbances observed at Stonyhurst, Melbourne, and Shanghai, on May 14, it may interest your readers to learn that earth-current disturbances were also noted on the Persian Gulf cables from 4 P.M. (Kurrachee time) on the 15th up to 5 A.M. on the following day.

Unusually strong earth-currents were also observed on June 3 and 4, on the cables between Bushire and Kurrachee; the current-strength at 2.40 P.M. on the 3rd, and 12.20 A.M. on the 4th, being reported as equal to fourteen Daniell's cells.

Kurrachee, November 8 HENRY C. MANCE

"Measuring the Height of Clouds"

IF THE electric light promising to be of great intensity at a small cost, the thought occurred to me that it might be used with advantage for the purpose of ascertaining the height of clouds. For, supposing an electric lamp sending a beam of light to the clouds, the spot where the light meets the latter, will be more or less visible, and we are obviously able to determine trigonometrically the height of the cloud.

By using two lamps, or a lamp and two reflectors, we may easily find also the rate at which clouds travel, by bringing the plane, passing through the axes of the beams of light, parallel to the direction in which the clouds move, and by noting the time it takes a cloud to travel from one beam of light to the other, having, of course, determined also the actual distance between the two spots of light on the clouds.

The above refers to observations during the night only, but by making use of coloured light, or by bringing a substance in the carbons of the lamp, the spectrum of which is easily recognisable, we might probably be able to work also during day-time.

Kew J. F. WILKE

The Weather

AFTER a week of unusually cold weather, the mean temperature having been 28°·5, and the wind constant from a northerly point, a thaw set in yesterday, and the wind became westerly, when immediately after sunset a rather unusual condition of weather occurred: viz., the rapid formation of a complete sheet of ice on the roads, though at the time, and till eleven P.M., the thermometer was 2° or 3° above the freezing-point.

As the sky was overcast at the time radiation cannot well account for it. Owing to the penetration of the cold, the surface must have retained a temperature considerably below 32° for some time after the air had become warmer and damper, so that the moisture was at once congealed.

Clifton, December 16 G. S. THOMSON

THE LAST EXPERIMENTS WITH THE 80-TON GUN

THE last experiments with the 80-ton gun at Woolwich deserve to be recorded, if only for the sake of showing that our scientific artillerists appear to be working in the proper channel. The last shot fired from the monster piece of ordnance was with the unprecedented charge of 460 lbs. of powder, and yet there was not so much strain upon the gun as that formerly exerted by charges one hundred lbs. less. The reason of this is in the main due to a change having been made in the character of the gunpowder employed; for whenever the former powder was used, even in lesser quantity, the pressure of the gas inside the gun rose at once. This would not so much matter if it could be shown that with the increase of strain, the work of the shot increased also. But such is not the case. For instance, in the case of two shots fired last week, one was sent on its way by 460 lbs. of prismatic powder, recording a velocity, we are told, of 1,626 per second, and a strain inside the gun of 19½ tons, while the other, with but 425 lbs. of cube powder, had a speed of only 1,600 feet, while it exerted a strain upon the weapon of 21 tons per square inch. The gun has been chambered—or in other words the cartridge cavity enlarged—to permit the introduction of heavier charges, as also to allow of a certain amount of air-space in the cartridge; but this modification in the weapon, beneficial as it may be, does not account, as we have shown, for the decrease upon the strain of the gun. This is due to the change in the powder.

In most of the former experiments a gunpowder of solid cubes, irregular in shape and measuring about an inch and a half, were employed; the recent results have been secured by thick six-sided prisms, about an inch across, and so accurately shaped that they may be packed together very closely. There is a single perforation in the middle of this prismatic powder, which, by the way, is of German origin, and when the cartridge has been securely packed so as to represent one solid mass, the perforations running through the whole length of the charge permit of the same being rapidly kindled. If the perforations were not there, half the charge would probably be expelled the gun before it was kindled; so that a packed cartridge of prismatic powder represents as nearly as possible a solid charge with tubes running its entire length, through which the kindling flames pass.

It has, of late, grown to be an axiom that the larger the gun the larger must be the grains of powder. A large grain of gunpowder burns slow because the fire is some time reaching the centre, and a slow-burning powder is what artillerists require for rifled guns. In a smooth-bore weapon the cannon ball fits loosely, and may be expelled at a bound; but in rifled cannon the shot, so to speak, moves upon a sort of railway, and it would never do to get the shot into motion too suddenly. An undue strain would be exerted upon the gun, while the velocity of the shot would not be increased. For a rifled gun, therefore, a slow-burning charge is absolutely necessary, and this is to be secured only by reducing the surface to be kindled. In the case of the prismatic powder, the grains, if they may be called by that name, are so closely packed that no fire can get between them, and hence the action of kindling is still further reduced.

Not only is the shape and density of powder grains now attracting particular attention, but the percentage of moisture contained in the material has also lately been under study. The amount of water in gunpowder to the minute extent existing in ordinary samples is found to influence combustion in a very marked degree, and nothing but an exhaustive series of trials can give sufficient data for practical application of so important an element in the science of explosives. In the meantime chemists are pointing out yet another source of uncertainty in the combustion of gunpowder, to which, notwithstanding