now, under the same conditions of seeing in which the rings appear continuous—their real form—in the smaller glass, the aperture be increased, the rings will be seen to break up into detached masses. It is very rare that they ever appear otherwise in a very large glass, for the seeing is almost never good enough thus to show them, accuracy of definition demanding much better air for a large than for a small aperture.

Now what happens to the lines of the image of a star—for the rings are simply circular lines—must happen in the same manner to planetary lines. They too must break up into a mosaic in a large glass whenever the rings do. This shows that planetary lines would necessarily assume a mosaic in a large glass contrary to their true form of continuous linearity. PERCIVAL LOWELL.

Lowell Observatory, Flagstaff, Arizona.

Colour-blindness.

IN the summary of the case of Mr. John Trattles published in NATURE of January 27 the expression is used:—"Dr. Ettles, who had examined Mr. Trattles, and was of opinion that he was not colour-blind, was also present."

That is only relatively accurate, and it is in the reservation that the real point lies. I examined Mr. Trattles on May 10, 11, and 12 last year. His spectrum range included both B and H lines—actually, 0·75 μ in the red to 0·39 μ in the violet. His sense of colour was less good about 0·54 μ than in the rest of the spectrum. Indeed, it was what one might call "bad." It was the presence of this defect which caused him to give such contradictory replies at Sir Wm. Abney's examination. My certificate, which was read in the House of Lords by Lord Muskerry in the debate referred to, viz. June 30, 1909, expressly stated that Trattles was competent to navigate a ship. It did not state that his colour vision was in all respects perfect.

Sir Wm. Abney and those associated with him concluded that, as the result of their tests, Trattles was "completely red-blind." I saw in those tests simply a confirmation of my own conclusions. We were at one in the symptoms, but we strongly differ in the diagnosis. If the Board of Trade starboard light were a yellow-green, Trattles would be unfit; but it is a blue-green, and he sees it perfectly.

As to red, he is anything but scoterythrous; that is what comes of being obsessed with a colour-vision theory.

One other point, the "recondite test of simultaneous contrast colours" is very much open to criticism. A simultaneous colour contrast is not a "colour" in the ordinary sense; it possesses no dominant wave-length; it is an optical illusion. Is an optical illusion so accepted and clear a test that it may be used as a touchstone to determine whether a man's career shall be ruined or not?

WILLIAM ETTLES.

34 Wimpole Street, Cavendish Square, W.,
January 30.

WE regret that we were in error in stating that Dr. Ettles was of opinion that Mr. Trattles was not colour-blind. It is interesting to know that he found the colour vision "less good" at a point in the spectrum not far removed from the region where the so-called "red-blind" person has a so-called "neutral band." The accurate determination of the spectrum range and of the deviations from the normal within that range constitutes the fundamental problem in discriminating colour-blindness. The accuracy of the determination, however, depends upon the methods adopted and the precision of the application of these methods.

With regard to the simultaneous contrast test, Dr. Ettles states that it is an optical illusion. If this be admitted, it is constant in its character in all normal individuals; hence any deviation may be fairly regarded as indicating a pathological condition of colour vision. As physiologists we cannot admit as a valid argument against the test that it is difficult or impossible satisfactorily to correlate the physical facts with the physiological manifestations.

But is it necessary or advisable that the divergence of opinion on the exact conditions of Mr. Trattles's colour vision should be further emphasised? The case has been adjudicated upon, and has amply demonstrated the need of reform either in the tests or in the application of the tests. The Board of Trade cannot, and ought not, to accept *any* risk of allowing a man with possibly dangerous defective colour vision to pass the examination. It is better that slight hardship should fall upon a few individuals than that many lives should be endangered; but the hardship must be minimised, and this object will be best attained by ensuring that the individuals shall be eliminated as early as possible in their careers. Hence it is of the utmost importance that the first examination shall be authoritative and conclusive.

THE WRITER OF THE ARTICLE.

Records of the Earthquake of January 22.

ON January 22 the Kew Milne horizontal pendulum recorded a large earthquake, of which the preliminary tremors commenced at about 8h. 52·6m. a.m., and the large waves at about 8h. 56·1m. The limits of registration, 17 mm., were exceeded between 8h. 58m. and 8h. 59m., and again at 9h. 0·4m. Synchronous with both maxima there were burrs on the magnetic declination trace. The largest, which simulated an oscillation of 1·5′ in declination, commenced about 8h. 57m., and lasted about five minutes. The movements on the declination trace were unquestionably seismic in character, and represented the mechanical effect of the principal earth tremors. The horizontal and vertical force traces were not sensibly affected. CHARLES CHREE.

The National Physical Laboratory (Kew Observatory Department), Richmond, Surrey, January 27.

An Earthquake Phenomenon.

A CURIOUS phenomenon connected with the earthquake of January 22 was that the maximum movement was accompanied by a sudden tilt. The amount of this was approximately one second of arc, its direction being towards the north-west. This would correspond to a rise of the ground on the south-east. It took place at about 8 a.m., when the booms of five horizontal pendulums were suddenly displaced from their normal position. Those oriented east and west were swung to the north, whilst those at right angles moved to the west. Pendulums in rooms 80 yards apart were displaced similarly. From 12.45 they crept back somewhat intermittently towards their original position, which they reached about 4 p.m.

Whether this indicates a local change in the dip of the strata (chalk) on which my instruments are founded or a more extended change of level cannot be stated with any certainty. At Bidston a pendulum oriented east-west was displaced towards the north, and at West Bromwich a pair of pendulums swung more on one side of their normal position than on the other. Their behaviour suggested a displacement similar to that observed at Shide. Permanent changes in the ground near the origin of a large earthquake are common. J. MILNE.

Shide, Isle of Wight.

The Preparation of Silicon. A Warning.

A COMMON method of preparing silicon is by mixing silica and magnesium powder in molecular proportions and heating until the following reaction takes place:—

$$SiO_2 + 2Mg = Si + 2MgO.$$

The majority of text-books recommend the use of silica in the form of silver sand or ground quartz, but they do not say it is absolutely necessary, or even desirable, that it should be in this form, and one well-known treatise states that precipitated silica and pure magnesium powder will yield very pure silicon. This authority adds that if the experiment is performed with precipitated silica the reaction is attended by a brilliant flash of light.