quently appeared in American journals. Criticism which ignores all that is good, and exaggerates all that is imperfect, in the work of any specialist, especially in that of so eminent a master as Dr. Günther, is greatly to be deprecated. G. BROWN GOODE.

Washington, June 1.

'A singular optical phenomenon.'

With reference to the 'optical illusion' to which your correspondent 'F. J. S.' drew attention (*Science*, No. 57, p. 275), and which has been abundantly illustrated and explained in later numbers, may I suggest to your readers who have not yet witnessed the phenomenon, to beg, borrow, or buy a few square inches of that finely perforated card which ladies were accustomed to use a good deal for working bookmarkers, initials, and the like.

There are several ways of using it with good effect. 1°. Before cutting the sheet, use it with a hand-mirror, standing (*a*) with the back to the light, and looking *through* both the real and the reflected cards; (*b*) facing the light, and looking through the one, *at* the other. 2°. Cut off a strip if the quantity available is restricted: otherwise divide in two more equal portions, and holding the smaller in one hand, between the eye and the larger, vary the distances absolutely and relatively, and also the relative inclinations (in their proper parallel planes); in this case, also, varying the position with respect to the light. 3°. Use the same close to a strong light, in such a way that the first surface (and the fourth) shall be in shade, while the second, and more especially the third, shall be in strong light.

The variations possible are, of course, far too numerous to admit of categorical statements. Still less can I attempt to describe what is seen. Nor, indeed, would it be a sensible proceeding to describe what is at once so easy, and so very much more interesting to see. My object is merely to point out the means and the manner.

I will, however, mention two of the more curious aspects presented. 1°. When a luminous background is seen through the reflected screen, and the latter is moved freely about in its own plane (which, of course, is supposed parallel to the glass), the phantom screen remains *stationary*. 2°. When one screen is held at arm's length, and the other two or three inches nearer to the eye, so as to produce a phantom some three or four times the size of the real pattern, the circumstances are favorable for concentrating attention on the contrast of colors presented. What I see is a sharply-defined rectangular network, as of blue steel wires with secondary and tertiary nets of doubtful color and indistinct form. As the intermediate screen is brought nearer to the eye, up to halfway, the intensity of color of the blue netting is much increased. I cannot pretend to give an exact indication, as I have only made a sort of hasty reconnoissance of this field. I notice, however, that the phenomenon presented by *inclining* the axes of the patterns to each other produces a wonderfully kaleidoscopic appearance.

To pursue the experiments, I should wish to use different patterns of perforation, and differently colored lights. J. HERSCHEL.

23 Suffolk Street, Pall Mall East,
London.

Guyot's 'Creation.'

In the notice of Guyot's 'Creation' there is an error which makes me say precisely the opposite of my meaning. On p. 601, first column, fifth line, for 'only' read '*more than.*' WRITER OF THE NOTICE.

PRESIDENT ELIOT ON A LIBERAL EDUCATION.

PRESIDENT ELIOT'S address before the Johns Hopkins university in February last, which appears in the June *Century*, though radical from one point of view, is not so from another. In maintaining that Greek should no longer be an indispensable requisite to the bachelor's degree, he takes what the conservative educators must regard as very radical ground. But when we examine what he would substitute for Greek, and what studies he regards as affording the most profitable culture, we see that he does not take the same view as the advocates of scientific education. The studies which he would elevate as at least co-equal with Greek, are the English language and literature, the French and German languages, history, political economy, and natural science. A careful examination will show that this proposed change would not be the substitution of a scientific for a literary culture, but rather the contrary. The leading studies in literature are now Greek and Latin; the modern languages, literature and history, being confessedly taught in a comparatively imperfect way. By adding history and the three modern languages to the curriculum from which the student makes his choice, a very large addition is made to the literary side of the banquet. This addition is hardly compensated by the increased consideration which he would give to political economy and natural science.

While it seems, therefore, that we can hardly regard President Eliot as a pronounced partisan of a scientific education, it must be admitted that the ground taken by those who are such partisans is not very definite. Their stereotyped complaint is that too much attention is given to languages and mathematics. Scientific studies are thus placed in contradistinction to those two subjects. Now, comparing our own education with that of other countries, it can hardly be claimed that we pay disproportionate attention to either mathematics or languages in this country. Not only is our mathematical education far behind that of France and Germany, but a much better mathematical training than our average student gets is absolutely necessary to an adequate comprehension of modern physical science. To take an example: it is safe to say that the number of our college graduates who know mathematics enough to understand clearly what physicists mean by the terms 'conservation' and 'transformation of energy,' is very small. One fact well worthy of consideration on both sides is, that, notwithstanding that the Germans