May 4th, 1837.

FRANCIS BAILY, Esq., V.P. in the Chair.

"On the adaptation of different modes of illuminating Light-houses, as depending on their situations and the object contemplated in their erection." By William Henry Barlow, Esq., in a Letter addressed to Peter Barlow, Esq., F.R.S., and communicated by him.

The letter of Mr. W. H. Barlow, addressed to his father, in which the paper is contained, is dated Constantinople, March 14th, 1837, and states that the experiments which he made with the Drummond light, and other means of illuminating Light-houses, and of which he now communicates the results, were undertaken at the request of the Turkish Government, with the view of placing lights at the entrance of the Bosphorus from the Black Sea. The object of his inquiry is to investigate the principles on which the illuminating power, resulting from the employment of reflectors, and of lenses, depends; and the most advantageous application of that power to the purposes of Light-houses.

In discussing the relation which exists between the illuminating power and the intensity of an artificial light, he observes that the former is proportional to the quantity of light projected on a given surface at a given distance; and that the latter is dependent on the quantity of light projected by a given area of the luminous body on a given surface at a given distance. Hence the intensity of a light multiplied into its surface is the measure of the illuminating power, whether the light proceed from one or from several luminous bodies: and the illuminating power is equal to that of a sphere of light, whose intensity and apparent surface are equal to that of the light itself at any given mean distance.

Within a certain limit of distance, the property of light which produces the strongest impression on the eye, is its intensity; but when the light is so remote that the angle subtended by it at the eye is very minute, as is generally the case in Light-houses, the intensity of the impression made on the retina is proportional only to the illuminating power. The mathematical investigations of the author lead him to the conclusion that all reflectors and lenses of the same diameter have the same illuminating power when illuminated by the same lamp; and that by diminishing the focal distance, and intercepting more rays, the illuminating power is not increased, but simply the divergence, and consequently the surface or space over which it acts. The author then proceeds to inquire into the comparative utility of lenses and reflectors, and arrives at the inference that the advantage gained by the employment of the former does not arise from their superior perfection as optical instruments, but from their using the light more economically, in consequence of their producing less divergence of the rays, both horizontally and vertically, and illuminating a much smaller space in the horizon. Rules are then deduced for the application of lenses and reflectors in Light-houses, according to the particular situations in which they are placed and the purposes they are intended to

serve. With this view, the author divides Light-houses into three classes: the first comprising Beacon or Warning Lights, placed in order to prevent the approach of vessels, and which consequently can never be nearer than three or four miles; the second being Guiding or Leading Lights, placed to guide a vessel, and therefore admitting of a very near approach; and the third including those which, according to the respective directions in which they are seen, have both these duties to fulfil. In the first we require great illuminating power, and a long duration of the brightest period, with a small angle of vertical divergence; in the second, less illuminating power, but a larger angle of vertical divergence are requisite, while the duration of the extreme brightness is of minor importance; and in the third, all these properties, namely, great illuminating power, a long duration of the brightest period, and a large angle of vertical divergence, are necessary.

May 11, 1837.

WILLIAM LAWRENCE, Esq., V.P., in the Chair.

Henry S. Boase, M.D., and William Tierney Clark, Esq., were elected Fellows of the Society.

A paper was in part read, entitled, "On the connexion between the Phenomena of the absorption of Light and the Colours of thin Plates." By Sir David Brewster, K.H., F.R.S.

The Society then adjourned over the Whitsun week, to meet again on the 25th instant.

May 25, 1837.

FRANCIS BAILY, Esq., V.P. and Treasurer, in the Chair.

The Rev. William Walton and Richard Westmacott, jun., Esq., were elected Fellows of the Society.

Sir David Brewster's paper was resumed and concluded.

The phenomena of the absorption of light by coloured media have been regarded by modern philosophers as inexplicable on the theory of the colours of thin plates, and therefore irreconcileable with the Newtonian hypothesis, that the colours of natural bodies are dependent on the same causes as the colours of thin plates. The discovery by Mr. Horner of a peculiar nacreous substance possessing remarkable optical properties, of which the author has already given an account, furnished him with the means of instituting a more accurate comparison between these two classes of phenomena. By a careful and minute analysis of the reflected tints of its first three orders of colours exhibited by a single film of the above-mentioned substance, they were found to consist of that part of the spectrum which gives the predominating colour of the tint mixed with the rays on each side of it. In analysing the transmitted beam, bands of the colours complementary to the former are seen, with intervening dark bands; and when the analysis is made with a high magnifying power, the