its margin is surrounded by a broad loose membrane, capable of very close application to any surface on which it is placed.

By elevation of the plates, a degree of exhaustion is thus occasioned; and the fish thereby firmly attaches himself to the shark, or to any other object.

In the same manner it would appear that the transverse serratures of the bottom of the toes of the lizard, by their elevation, occasion a degree of exhaustion or partial vacuum, confined by the broad membrane which is attached all round each of the toes.

The author is of opinion, that the feet of the common fly act upon the same principle. Their under surfaces, when highly magnified, appear to be concave, as they are represented by Kellar; and he thinks it cannot be doubted that these cavities are employed to rarify the air between them and the surfaces to which they are applied, and thus support the weight of the fly, in opposition to gravity, when suspended from a ceiling.

On the Communication of the Structure of doubly-refracting Crystals to Glass, Muriate of Soda, Fluor Spar, and other Substances, by mechanical Compression and Dilatation. *By* David Brewster, *LL.D. F.R.S. Lond. and Edin.* *In a Letter addressed to the Right Hon. Sir* Joseph Banks, *Bart. G.C.B. P.R.S.* Read February 29, 1816. [*Phil. Trans.* 1816, *p.* 156.]

The subjects here chosen for experiment are such bodies as have in general no power of polarizing or depolarizing light, and the means employed for communicating these properties are purely mechanical. In the first instance, a piece of plate-glass was taken, and compressed edge-wise between two screws, and was found to polarize light in every part of its breadth, with depolarizing axes, making an angle of 45° with the edges of the plate.

When a narrow slip of plate-glass is attempted to be bent edgewise, the inner edge becomes compressed sufficiently to produce the effect of depolarization; and the exterior edge of the curve, by being dilated, also depolarizes: but the characters of the fringes of colour produced in the two cases are different; since those which arise from compression are such as are produced by calcareous spar and beryl; but those caused by dilatation of the exterior edge are such as appear from the action of sulphate of lime, quartz, and other bodies of that class.

The author observes, that the tints polarized ascend in Newton's scale, in proportion as the forces of compression or dilatation are increased.

When two plates under a state of compression are combined transversely, the same phenomena are exhibited as by means of a plate formed of a doubly-refracting crystal.

The effect of two plates of compressed glass, similarly placed, is the same as that of a double plate; but if they be placed transversely, then the tints are such as are due to the difference of their thick-

nesses: but the reverse will happen in each case if one glass be compressed and the other dilated.

If a compressing force be applied to the centre of a plate of glass, it will exhibit the black cross and other phenomena to be seen by means of doubly-refracting crystals.

If a plate so compressed be inclined to the polarized ray, the tints of colour will ascend or descend, according to the direction in which it is inclined.

If a plate to which the power of depolarization has been given by heat be compressed, the tints of the interior fringes rise in the scale, and those of the exterior descend, when the axis of pressure is perpendicular to their direction.

The same effects which are thus produced upon glass by compression, are produced in a similar manner upon such crystallized bodies as do not possess these properties in their natural state. But those bodies which already possess the doubly-refracting structure in a high degree, as calcareous spar, rock crystal, beryl, &c., suffer no change by any degree of mechanical compression to which the author has subjected them.

Since the tints of colour communicated to polarized light depends on the degree of force applied to glass, through which it is transmitted, Dr. Brewster conceives that a convenient instrument might be constructed for measuring the intensity of forces, which he would call a Chromatic Dynamometer; and in the same manner might variations of temperature, or humidity of bodies be measured, with the assistance of a little ingenuity, by chromatic thermometers and hygrometers.

In the prosecution of these experiments, the author examined the properties communicated to jelly by variations of its density from drying, and contrived means of giving it permanent power of depolarization, by the constrained position in which it was allowed to harden. And he found that the polarizing force of distended isinglass far exceeds any which can be given to glass, either by heat or pressure, and is even greater than that of beryl, which owes its power to crystalline texture.

In conclusion, the author expresses his hope that the principles here investigated afford a solution of the most important part of the problem of double refraction, by ascertaining the mechanical condition of both classes of doubly-refracting crystals, although the division of incident light into two portions oppositely polarized yet remains to be accounted for: and he thinks we must remain satisfied with referring this to the operation of some peculiar fluid, which he conceives to be the principal agent in producing all the phenomena of crystallization and double refraction.

Dr. Brewster adds, that a recent experiment (which he does not describe) upon the polarizing qualities of a body of which the densities vary in regular minute strata, induces him to think more favourably than heretofore of the undulatory system of light.