http://www.geology.19thcenturyscience.org/books/1831-Herschel-NatPhil/README.htm

one. If a shilling be laid at the bottom of a basin of water, and viewed obliquely, it will appear to be raised by the water; if, instead of water, spirits of wine be used, it will appear more raised; if oil, still more:—but in none of these cases will it appear to be thrown *aside* to the *right* or *left* of its true place, however the eye be situated. The *plane*, in which are contained the eye, the object, and the point in the surface of the liquid at which the object is seen, is an upright or *vertical* plane; and this is one of the principal characters in the *ordinary refraction* of light, viz. that the ray by which we see an object through a refracting surface, although it undergoes a bending, and is, as it were, broken at the surface, yet, in pursuing its course to the eye, does not *quit a plane perpendicular to the refracting surface.* But there are again other substances, such as rock-crystal, and especially Iceland spar, which possess the singular property of *doubling* the image or appearance of an object seen through them in certain directions; so that, instead of seeing one object, we see two, side by side, when such a crystal or spar is interposed between the object and the eye; and if a ray or small sunbeam be thrown upon a surface of either of these substances, it will be split into two, making an angle with each other, and each pursuing its own separate course:—this is called *double refraction.* Now, of these images or doubly refracted rays, *one* always follows the same rule as if the substance were glass or water: its deviation can be correctly calculated by Snell's law above mentioned, and it does not quit the plane perpendicular to the refracting surface. The other ray, on the contrary, (which is therefore said to have undergone *extraordinary refraction*) *does* quit that plane, and the amount of its deviation from its former course requires for its determination a much more complicated rule, which cannot be understood, or even stated, without a pretty intimate knowledge of geometry. Now, rock-crystal and Iceland spar differ from glass in a very remarkable circumstance. They affect naturally certain regular figures, not being found in shapeless lumps, but in determinate