First Facts. The common and obvious Phænomena of Light and Vision.

By the *Idea of a Medium* Light and Vision take place by means of something intermediate

First Law of Phænomena. The effects take place in straight lines denoted by the Term *Rays*.

Facts of ....

Rays falling on water, specula, &c.
Euclid? Ang. Inc. equals Ang. Reflection.

Rays passing through water, glass, &c. Measures. Ptolemy.
Snell. Sin. Refr. to Sin. Inc. in giv. *Ratio* in same med.
Newt. Refr. Rᵒ. is diff. for diff. colours, but in same med. is const. for each colour.

Colours seen by prisms, in rainbow, &c.
By measures of Refraction.

Colours in diff. transp. substances. Optical instrumᵗˢ.
Dispersion of colours is same when Refr. is diff. Measures. Dollond.

Two Images in Rhomb. of Calcspar.
Measures. Huyghens.
Double Refr. in biaxal crystals.

Two Images in other crystals.

Two Rhombs of Calcspar make 4 images alternately appear and disappear. Huyghens. Newton.

Rays of light have four *Sides* with regard to which their properties alternate.
Idea of *Polarization* introduced, which governs subsequent observations. *Dipolarization* with Colours.

Fringes of shadows. Grimaldi. Hook. Newton.
Spectra of gratings. Fraunhofer.
Colours of striated surfaces. Coventry's Micrometʳ. Barton's Buttons. Young.
Colours of thick Plates. Newton.
Colours of thin Plates. Hook. Newton.

Pol. Rays in axis of Quartz give a peculiar set of colours.
Pol. Rays oblique in Quartz give peculiar rings, &c.

Dollond. Propⁿ. of Refr. Rᵒ. is diff. in diff. med. *Achromatism.*
Ratios not reconcilable. *Irrationality.* Blair.

Huygʰ. Law of Double Refr. exp. by a spheroid. Fresnel.

Law exp. by surface of 4 dimˢ.

Rays are polarized by Calcspar, Quartz, &c. Brewster.
Newt. Malus. Ray pol. in *principal plane* of Rhomb.; and perp. to it.

Rays are polarized by biaxal crystals.
Brews. Biot. Ray pol. in plane bisecting ang. at axis; and perp. to it.

Rays are polarized by Tourmaline, Agate, &c.
Brews. Ray pol. paral. to axis.

Rays are polarized by Refl. at glass.
Malus. Ray pol. in plane of Refl. for *given angle*.

Rays are polarized by transmission through glass.
Malus. Ray partially pol. in plane perp. to plane of Reflection.

Variable qᵗʸ. of pol. refl. light paral. plane of Refl. Arago.

Variable qᵗʸ. of pol. refl. light perp. plane of Refl.
Change of plane of pol. by Refl. Arago. None refl. if tan. ang. equal Refr. Rᵒ. Brewster.

Whole light reflected by internal Refl.
Light is *circularly pol.* by 2 Refl. in *Fresnel's Rhomb.* Fresnel.

Pol. Rays through uniaxal crystals give colours. Rings. Wollaston.
Optical classification of crystals.
Tint is as sq. of sin. Biot.

Pol. Rays through biaxal crystals give colours. Arago. Brewster.
Tint is as sin. α sin. β. Brewster. Biot. Lemniscates. J. Herschel.

Pol. Rays through imperf. crystallized bodies give colours. Biot. Arago. Brewster.
(Glass strained, jellies prest.) Brewster.

Plane of Polⁿ. twisted diffʳˡʸ. for diff. colours. Biot. Arago.
† in dirⁿ. of plagihedral faces. J. Herschel.

Pol. Rays through certain liquids give a peculiar set of colours.
Plane of Polⁿ. twisted. Biot.

The Laws of these Phænomena were never discovered till Theory had indicated them.
Fringes obliterated by stopping light from one edge or interposing a glass. Young. Arago.

Newton's Scale of Colours.
Fits of Rays. Newton.

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* Refl. produced by spherical undulⁿˢ.

* Refr. produced by spherical undulⁿˢ. of diff. vel. for diff. colour.

† Explanation imperfect.

* Refr. produced by spheroidal undulⁿˢ.

* Refr. produced by curve surf. undulⁿˢ.

* Polⁿ. being prod. by resolution of transvᵛ. undulⁿˢ.

* Polⁿ. being prod. by resolution of transvᵛ. undulⁿˢ.

† Explan. imperfect.

* Polarization being produced by resolution of transverse undulations.

* Undulⁿˢ. being comᵈ. acc. to laws of elastic bodies.

* Undulⁿˢ. being comᵈ. acc. to a certain hypothesis.

* Imposs. formulæ being interpreted by analogy.

* By interf. of resolved parts of transverse undulⁿˢ.

* By interf. of resolved parts of transverse undulⁿˢ.

† Explan. imperfect.

* Same hypothesis explains separation of rays in axis and oblique. † Explanation imperfect. ᵏ Maccullagh.

* By interf. of resolved undulⁿˢ. of 2 rays circularly polᵈ. in opp. directions. * Fresnel.

* By interf. of resolved undulⁿˢ. of 2 rays elliptically polᵈ. in opp. directions. * Airy.

† Explan. wanting.

* By interf. of rays from edges. * Young.
* By interf. of rays from all parts. * Young.
* By interf. of rays from all parts. * Fraunhofer.
* By interf. of undulⁿˢ. from two surfaces. * Young.
* By interf. of undulⁿˢ. from two surfaces. * Fresnel.

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* Huyghens.
Reflection and Refraction are propagation of undulations.

* Young. * Fresnel.
Polarization in crystals is transverse undulations.

* Fresnel.
Polarization in Reflection and Refraction is transverse undulations.

* Fresnel. * Arago.
Dipolarized Colours are produced by interference of Rays polarized in same plane, length of undulation being different for different colours.

Young. Fresnel.
Colours of Fringes, Gratings, Striæ, thick Plates, thin Plates, &c. are produced by interference of undulations, length of undulation being different for different colours.

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* Undulations being propagated by the uniform elasticity of each medium. Young.

* Undulⁿˢ. prop. by elʸ. of medium diff. in 2 diff. dirⁿˢ. (*axis of crystal.*)

* Undulⁿˢ. being prop. by elasticity of med. diff. in 3 diff. directions (*axes.*)

Reflection and single and double Refraction are propagation of undulations by crystalline elasticity.

* Fresnel.
Double Refr. and Pol. arise from same cause.

Young. Fresnel.
Light is transverse undulations propagated in media by elasticity dependent on axis, when crystalline.

Fresnel.
Light is transverse undulⁿˢ. transmitted from one med. to another according to probable hypotheses.

Young. Fresnel.
Colours result from interferences, the lengths of undulation being different for different colours.

THE UNDULATORY THEORY OF LIGHT.