Presidential address

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PRESIDENTIAL ADDRESS

BY MR. W. H. E. THORNTHWAITE, F.R.A.S. (*President, 1899*).

Delivered at a Meeting of the Optical Society on October 26th, 1899.

WHEN, at the request of the Committee that I should give an inaugural address, I considered the selection of a subject connected with the science of optics, two important but very different factors presented themselves:—The immensity of a subject of such infinite variety, and the extent of the other business to be transacted this evening. I decided, therefore, that a short and general address would best meet the case.

We do not yet thoroughly understand the nature of light or even if the corpuscular or undulatory theory is absolutely the correct one, though the latter is now universally received. Even about some of the properties of light we know but very little. Such knowledge must, indeed, be infinite. For example, we are told that the brightest light which exists we may have never seen, as, though it has been travelling at the rate of 186,000 miles per second, the light of some fixed stars may not yet have reached the earth; and yet beyond these stars there is still infinite distance. The mind of man fails to grasp such facts, and, of course, no telescope, however powerful, is of any assistance in magnifying light which is utterly beyond human vision. The light coming from the ultra-violet rays of the spectrum or from the Röntgen rays, is also invisible and only proves its existence by its marvellous effects. On the other hand there are beauties in Nature so minute as to be equally beyond the power of any microscope to resolve.

Though the nature of light is even now not fully understood, many of its properties were investigated in very early days. Aristotle, several hundred years before the birth of our Lord, tried to solve the question, “Why cannot we see in the dark?” our rather, “What is darkness?” The laws of reflexion were understood before those of refraction, the former being found by the observation of objects when reflected from the surface of water or burnished metal; the latter from the magnifying and displacing effects noticed when objects are viewed through transparent vessels filled with fluid, to which allusion is made by Pliny. In the first century Cleomedes noticed that a coin placed at the bottom of

a cup appeared to rise as water was poured in, and about the same date Ptolemy discovered atmospheric refraction and wrote his great work on optics, treating of both refraction and reflexion. About the time of the Norman Conquest, El-Hasan was the earliest philosopher to give a reasonable description of the anatomy of the eye and of the optical principles of vision. Since then optics has been the study of every eminent scientific man; I specially mention the following:—Roger Bacon, who is said to have invented convex spectacles, though probably they were used much earlier; Kepler and Galileo; Huyghens, who discovered polarisation, and Cassini; Newton, the author of the great “Principia,” but a supporter of the corpuscular theory with Laplace; Römer, who discovered the velocity of light in 1676, and first used the transit instrument; Bradley, who discovered the aberration of light; Dolland, Herschel, Fresnel, who discovered the true theory of diffraction; Young, who discovered the undulatory theory; Fraünhofer, Littrow, Brewster, Airy, who first corrected astigmatism; Foucault, Abbe, Donders, Crookes and Lord Rayleigh, not to mention the able Vice-Presidents of this Society, who have done so much to advance the application of optical science in various directions.

To allude to a tithe of the wonderful optical instruments these eminent men have invented and improved would take a very long time, and I would only select the few which are figured in the margin of the diploma of the Spectacle Makers Company. Where would medical science, histology, and biology be without the aid of the microscope? Has it not been the means of explaining to us the principles of generation, circulation, and bacteriology? Does not the telescope enable us to take time to the fraction of a second by means of the transit star? How the addition of a telescope has improved the accuracy of the sextant and other mathematical instruments? How many new metals, new elements, have been discovered by means of the spectroscope? How, but by the help of this instrument, could we analyse things which we can see but not handle, and so discover the composition of the sun, fixed stars, and nebulae? Then, most wonderful of all lights, we have a light that we can only detect by its shadows, whose depth constitutes an invaluable guide to the military surgeon and enables him by means of the x or Röntgen rays to localise the position of bullets without the painful operation of probing. The practical utility of Sir William Crookes’ radiometer has yet to be proved, but at least it has demonstrated that light can be a source of motive power without cost!

I might refer to other optical instruments, such as the camera, and

Nature's camera, the eye, with its iris diaphragm, its focusing screen and its wide angle single lens evidencing so little aberration, either chromatic or spherical; and also to the many optical instruments which are employed to test, improve and correct vision; but I forbear and, with the very best wishes for the success and development of the Optical Society, and an earnest hope that its members will follow the lead of the eminent men I have alluded to, and also will honour the discussions of the Society by papers describing inventions of equal scientific interest and value, I conclude.