ROBERT BOYLE'S "UNCOMMON OBSERVATIONS ABOUT VITIATED SIGHT", (LONDON, 1688)*

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ROBERT BOYLE (1627–1691) is known to every schoolboy for his discovery of the law of gaseous elasticity, "Boyle's law". He was one of the foremost "experimental natural philosophers" of his time, an original fellow of the Royal Society of London and author of many works dealing with physics, chemistry, physiology, theology, etc. Not so well known perhaps is that he was created Doctor of Medicine of Oxford University in 1665 (Foster, 1891) and that scattered throughout his scientific writings are many discussions of medical subjects often based on his own astute clinical observations. Among these are several records of patients with visual disturbances and eye diseases, a subject in which he had a particular interest, as shown for example by his researches into the physics of light and the physiology of vision in *Experiments and Considerations Touching Colours* (1664). This interest doubtless derived from his hypochondriacal concern when a youth about "a sense of decay in my Eyes" (Boyle, 1693), for which he consulted the great William Harvey (Boyle, 1663). For the rest of his life this "weakness made him very tender of them, and extremely apprehensive of such distempers as might affect them" (Birch, 1744).

Three years before his death he gathered together a number of the more unusual ophthalmological cases he had seen under the title "Some Uncommon Observations about Vitiated Sight", and appended them as a separate tract to *A Disquisition about the Final Causes of Natural Things* (1688):

"Because that, the Eyes being those Parts of the Bodies of Men and other Animals, that I pitch'd upon in the Foregoing Treatise, to Strengthen the Doctrine deliver'd in it about Final Causes; it seem'd Suitable Enough to my Subject and Design, to mention some Uncommon Things that related to Vision or the Organs of it, that We may be invited *both* to Admire the Wisdom of God, which, to furnish Man with a Sense that requires the Concourse of so very many things, has, if I may so speak, Crowded them into so Small an Engine as an Eye; *and* to Celebrate his Goodness too, which has been Display'd in that, notwithstanding that the Eye is so very Compounded a Part, and the Sight so easily Vitiated yet the most part of Men by far do, from their Cradles to their Graves, enjoy the Benefit and Comfort of so Necessary and Noble a Sense" ([242–244]).

This tract appears to have remained unnoticed by historians of ophthalmology,

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FIGURE.—Title page of one of the two issues of *A Disquisition about the Final Causes of Natural Things* by The Honourable Robert Boyle (T.H., R.B.). (Fulton, No. 186, 186A.)

e.g. Hirschberg (1899–1918), James (1933), and Sorsby (1948). Fulton (1932), in his *Bibliography of the Honourable Robert Boyle*, considered that it was “one of the first in which this method of teaching [by demonstrating case histories] was employed in an ophthalmological treatise”.

There are fourteen observations in all, each with a commentary by Boyle:

Observation 1.—A man with post-traumatic progressive blindness, who had lost colour vision but could distinguish white objects.

Observation 2.—A healthy young man with post-traumatic cataract over the upper half of the pupil; his visual acuity was diminished but he could still discern white objects.

Observation 3.—A man with bilateral cataracts which had been badly extracted leaving him with synechiae, who was nevertheless still able to read in the dark “with the help of his *Cataract Spectacles*”.

Observation 4.—A man with two distinct cataracts in the upper part of one eye following trauma, “Two Cataracts at a time in one Eye being some what Extraordinary”.

Observation 5.—A man with diplopia for distant objects accompanied by “divers Black Flyes and litle Leaves, that pass’d now and then before his Eyes . . . some Persons, before their Cataract, have complain’d that at some Distances they saw Objects almost Double”.

Observation 6.—A woman who had had cataracts for many years (long enough to have been “brought a Bed of Six Children”) had her sight restored completely “by having the Cataracts Couched. . . . It may be worth Observing, How long The better sort of Cararacts, tho’ they hinder Sight for a time . . . yet may remain in the Eye, without Spoiling the Optic Nerve or Hindring Vision when once the Cataract is remov’d”. Another girl was aged eighteen when she had congenital cataracts “so happily Couched, as afterwards to have the benefit of Sight”.

Observation 7.—This records the experiences of three men who had difficulty in judging distances following blindness in one eye. Another patient, despite a complete sixth nerve palsy in one eye since the age of two, did not suffer from diplopia.

Observation 8.—See below.

Observation 9.—A woman with bilateral miosis—“which is often esteem’d a good Sign”—saw better in the dark: “In which odd Case, whether the smallness of her Pupils, which might possibly be Contracted too much by the Day-light, and might be Expanded by the Recess of so much Light . . . I shall not now stay to Enquire”. Also mentioned is “the rare Case of a Learned old Divine, who complain’d to me that he was forced to write his Letters and Books by Night, because, during the Day-time, his Right Hand shook so much that he could not manage a Pen”.

Observation 10.—“Two Ladies of very distant Ages, but very near of Kin”, one of whom was “subject to Convulsive, but not Epileptick, Fits”, both at times saw “Sparks of Fire”.

Observation 11.—A young woman who regained her sight after five years’ blindness: “I ask’d the Lady whether she were not troubled with Female Obstructions? to which she Answer’d me, she was not now, but that formerly she had been much subject to them, having been obstinately troubled with the Green-sickness”.

Observation 12.—A man with blindness for unspecified colours.

Observation 13.—A woman with attacks of unilateral headache followed by “a Convulsive Motion in One” eye “whereby it would not only be drawn away, but, which was very strange, All White Things, and most other Objects, that she look’d on with that Eye, appear’d Green to her”; she also suffered from diplopia during an attack.

Observation 14.—See below.

Observations 8 and 14 seemed to us of especial interest, and we therefore give them in full.

Observation 8

“It may be worth while to Observe, that a very great Distention may be made of the Parts of the Eye, without Spoiling the Sight; of which I lately saw an Instance in a Patient of that Ingenious and Experienced Oculist, Dr. *Turbervill*. This was a

Gentlewoman about one or two and twenty years of Age, Whose Complexion and Features would have made her Handsom, if she had not had that sort of Eyes, which tho' rarely met with, some call Ox-Eyes; for Hers were swell'd much beyond the size of Human Eyes, in so much, that she complain'd, they often frighted those that saw Her, and were indeed so Big, that she could not move them to the Right Hand or the Left, but was constrain'd to look strait forward; or if she would see an Object that lay Aside, she was oblig'd to turn her Whole Head that way. And so she answer'd me she was, when she set herself to Read in a Book, unless she did with her Hand move the Book from one side to another, to bring the ends of the Lines directly before her Eyes. She told me her Eyes did not always retain the same measure of Tumidness, and that the very day I saw them, they had been in the Morning much more Swell'd than when I look'd upon Her. But that which was more remarkable, was, that not only she could, for all this, See very well and distinctly, and, as I just now intimated, could Read Books, but her Sight had continued good, tho' she had this Distemper these twelve years. And, which is more strange, she answer'd me, that her Visive Power was so little Prejudic'd by this Distemper, when it first came upon her, that she never knew any thing was amiss in her Eyes, till her Friends told her of it, when they found it had continued too long to be a meerly Casual and Transient Tumor. But, tho' this odd Accident did not Impair her Sight, it occasion'd great Pains in her Eyes, for which she took Purging and other Medicines, with so little Success, that both she and her former Physicians, thought her case Desperate; there appearing no way of dislodging a Humour so long settled there. Upon which I propos'd *Salivation*, as the least unlikely way that remain'd to Resolve and carry off the Peccant Humour. But this, tho' much approv'd by her Doctor, the Modest Patient would by no means consent to”.

Observation 14

“Some may think that a Man has rather an Excellent, than a Vitiated Sight, who can See Objects with a far less degree of Light than other Men have need of to Discern them. But tho' an Extraordinary Tenderness may be a kind of Perfection in the Eyes of *Bats* and *Owls*, whose usual Food may be more easily Purchased by Twilight: Yet as to Man, the main part of whose Actions is to be perform'd by the Light of the Day, or some other almost Equivalent; it may Argue the provident goodness of the Author of Nature, to have given Him Eyes Constituted as those of Men generally are: Since, That a very great Tenderness of the *Retina*, or principal part of the Organ of Sight, would be, if not an Imperfection, at least a great Inconvenience, may appear by the Memorable Story I am going to Relate.

In the Army of the late King of Hapy Memory, (*Charles* the First) there was a Gentleman of great Courage and good Parts, that was Major to one of the Regiments; who being afterwards by the prevailing Usurpers forc'd to seek his Fortune abroad, ventur'd to do his King a piece of Service at *Madrid*, which was of an Extraordinary Nature and Consequence, and there judg'd very Irregular. Upon this he was committed to an Uncommon Prison, which, tho' otherwise Tolerable enough, had no Window at all belonging to it, but a Hole in the thickness of the Wall, at which the Keeper once or twice a day put in liberal provision of Victuals and Wine, and presently Clos'd the Window, if it may be so call'd, on the Out-side, but not perhaps very Solicitously. For some Weeks this poor Gentleman continu'd in the Dark, very Disconsolate. But afterwards he began to think he saw

some little Glimmering of Light, which from time to time Increased; insomuch, that he could not only Discover the Parts of his Bed, and other such large Objects, but at length came to Discover things so Minute, that he could Perceive the Mice that frequented his Chamber, to eat the Crumbs of Bread that fell upon the Ground, and Discern their Motions very well. Several other Effects of his Sight in that Dark Place He Related. And that which Confirms that this Proceeded mainly from the great Tenderness the Visive Organ had acquired, by so long a stay in so Obscure a Place, was, that when after some Months, the Face of Affairs Abroad being somewhat Chang'd, His Liberty was restor'd him, he durst not leave his Prison Abruptly, for fear of losing his Sight by the Dazling Light of the Day; and therefore was fain to Accustom his Eyes by slow degrees to the Light. This Strange, as well as once Famous Story, I the less Scruple to set down in this Place, because I had the Curiosity to learn it from the Gentleman's own Mouth, who acquainted me with other Particulars about it, that, for want of the Notes I then took, I shall not now venture to speak of".

Discussion

Observation 8.—This patient suffered from exophthalmic ophthalmoplegia. Exophthalmos, whether due to enlargement or protuberance of the eye, had been vulgarly known for centuries in this country as "Ox-Eyes" (*cf.* Du Laurens, 1599); Hirschberg (1899) credited Paulus Aeginata (7th century A.D.) with having been the first medical writer to mention the condition. Thyrotoxicosis in association with exophthalmos was first recorded in 1825, in a posthumous edition of Parry's writings and was subsequently fully described by Graves (1835) and Basedow (1840). The term ophthalmoplegia was first introduced by Stoeber in 1834 (Hirschberg, 1912), while, according to Duke-Elder (1952) following Brain and Turnbull (1938), "external ophthalmoplegia in thyrotoxicosis associated with 'malignant' exophthalmos was first described by Naumann (1853) in a case wherein the protruding eyes were immobile".

There is insufficient evidence to conclude that Boyle's patient was suffering from thyrotoxicosis, although perhaps "the Modest Patient" might mean "the nervous patient"; and her refusal to accept his treatment "tho' much approv'd by her Doctor" may have resulted from this. There is no hint of systemic disease: that "both she and her former Physicians, thought her case Desperate" probably means only that they were concerned at the length of time the exophthalmos had persisted unchanged. It is of course possible that she had earlier suffered from thyrotoxicosis which had subsided while the exophthalmos remained.

It is of interest that she was not the only puzzling "Patient of the Ingenious and Experienced Oculist, Dr. *Turbervill*" whom he referred to Boyle for a second opinion. Indeed it seems almost as if his contemporaries considered Boyle something of an authority on obscure conditions of the eye, for Turberville (1684) wrote of another patient whose eye disease he could not

diagnose: "him I carried to Mr. Boyle, as a fit subject for so great a *Philosopher* to make his remarks on".

Observation 14.—In this Boyle gave a comprehensive account of adaptation to dark and light which anticipated Aubert's classical account of 1865 (Duke-Elder, 1932) by almost two hundred years.

Summary

Attention is drawn to some of Robert Boyle's contributions to ophthalmology. These include classical accounts of exophthalmic ophthalmoplegia and adaptation to dark, which preceded by almost two hundred years the writings of those to whom credit for the first description is usually assigned.

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