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Book review - A Natural History of Vision:

A Natural History of Vision, by Nicholas J. Wade, The MIT Press, Cambridge, MA, 1998, 397 pages + bibliography + name index + subject index.

This book consists mainly of quotations from natural philosophers and scientists writing on various aspects of vision. These quotations are used to illustrate the development of various ideas and theories. The quotations begin with the ancient Greeks and extend to 1840. The author chose 1840 as the time when vision science became an experimental science conducted in the laboratory rather than in nature, as instruments were constructed for the purpose of studying vision. The author stated that his intention was "...to treat vision as an observational discipline in its own right." The author has extensive previous publications on the history of vision science. The nine chapters in the book are:

- Chapter 1. Introduction
- Chapter 2. Light and the Eye
- Chapter 3. Color
- Chapter 4. Subjective Visual Phenomena
- Chapter 5. Motion
- Chapter 6. Binocularity
- Chapter 7. Space
- Chapter 8. Illusions
- Chapter 9. Conclusion

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Chapters other than the introduction and conclusion are divided into topical sections, with the number of sections varying from seven to twelve. For example, in the longest chapter, Light and the Eye, the sections are: Optics, Eye and camera, Accommodation, Errors of refraction and their correction, Astigmatism, Anatomy of the eye, Retina, Blind spot, and Visual pathways. The second longest chapter, Binocularity, has the following sections: Binocular vision, Binocular single vision, Binocular double vision, Binocular contour rivalry, Eye dominance, Monocular compared with binocular vision, Strabismus (squint), Stereoscopic vision, Retinal disparity, and Panum's limiting case.

Each section begins with an overview by the author followed by selected

quotations in chronological order. Those quoted include many well-known thinkers and natural philosophers, such as Aristotle, Descartes, Euclid, Ibn al-Haytham (Alhazen), Kepler, Leonardo da Vinci, Newton, Ptolemy, and Young; scientists readily recognizable to students of vision, such as Brewster, Müller, Purkinje, and Wheatstone; as well as many lesser known writers. Along with the quotations there are many black-and-white illustrations. For example, there are twenty cross-sectional diagrams of the anatomy of the eye, ranging from a diagram of the eye based on the description by Democritus (ca. 400 B.C.) to Alhazen to Vesalius to Platter to Scheiner to Descartes to Thomas Young, as well as others.

One remarkable aspect of this book is that the margins of most of the pages are graced with black-and-white portrayals of the faces of the persons who are quoted. Birth and death years are given along with these images.

It must have taken considerable effort on Wade's part to assemble all of the quotations and images in this book. It is enlightening to read descriptions of vision and visual phenomena in the actual words of the original writers (or those of the translators). The book is somewhat difficult to read from front to back because of the differing and archaic writing and translation styles, but the perspective gained from the chronological presentation of ideas is worth the effort. Among the quotations that one can read are:

Kepler's 1604 description of retinal image formation (p. 9):

Thus vision is brought about by a picture of the thing seen being formed on the concave surface of the retina. That which is to the right outside is depicted on the left on the retina, that to the left on the right, that above below, and that below above. Green is depicted green, and in general things are depicted by whatever colour they have...the greater the acuity of vision of a given person, the finer will be the picture formed in his eye.

Scheiner's 1619 demonstration of the existence of accommodation (p. 39):

Make a number of perforations with a small needle in a piece of pasteboard, not more distant from one another than the diameter of the pupil of the eye...if it is held close to one eye, while the other is shut, as many images of a distant object will be seen as there are holes in the pasteboard...at a certain distance, objects will not appear multiplied when they are viewed in this manner.

Purkinje's 1823 description of the images of a candle reflected from the refracting surfaces of the eye (p.47):

If we place the candlelight about six inches from someone's eye in order that we can see the flame on the cornea when we are sitting to the side of the visual axis of the eye, within the circle of the pupil nearer the periphery, we will see in the back of the pupil a blinking flame, still smaller in its diameter but reversed and of feeble illumination, which we can easily judge, by comparing it with the one on the artificial lens, that it is reflected from the posterior wall of the lens. The front surface of the lens, and partly its inner matter, under the conditions of full transparency we can make accessible for observation if, by looking into the pupil from the side and placing the light on the opposite side of the eye, the straight lines from the eye to the observer and from the light of the candle shining into the pupil form an obtuse angle. Here one will see an elongated image of the flame, which, because it is straight, shows that it is reflected from the convex surface of the lens....Both of these methods for the observation of the surfaces of the lens will not be without use, I think, in therapeutic investigation, especially where one wants to differentiate precisely whether only the capsule of the lens is involved, the lens itself, its posterior surface, or the vitreous humor. From the exact measurements of the flame reflections on the lens of a living human subject one can determine with considerable labor its shape and its relation to the acuity of vision.

Aristotle talking about myopia and presbyopia in about 330 B.C. (p. 52):

Why is it that though both a short-sighted and an old man are affected by weakness of the eyes, the former places an object, if he wishes to see it, near the eye, while the latter hold it at a distance? Is it because they are afflicted with different forms of the weakness? For the old man cannot see the object; he therefore removes the object at which he is looking to the point at which the vision of his two eyes meets, expecting them to be able to see it best in this position; and this point is at a distance. The short-sighted man, on the other hand, can see the object but cannot proceed to distinguish which parts of the thing at which he is looking are concave and which convex, but he is deceived on these points. Now concavity and convexity are distinguished by means of the light which they reflect; so that at a distance the short-sighted man cannot discern how the light falls on the object seen; but near at hand the incidence of light can be more easily perceived.

Thomas Young describing his astigmatism in 1801 (p. 63):

When I look at a minute lucid point, such as the image of a candle in a small concave speculum, it appears as a radiated star, as a cross, or as an unequal line, and never as a perfect point, unless I apply a concave lens inclined at a proper angle, to correct the unequal refraction of my eye.

And George Biddell Airy describing his own astigmatism in 1827 (pp. 63-64):

I observed that the image formed by a bright point (as a distant lamp or a star) in my left eye was not circular, as it is in the eye which has no other defect than that of being near sighted, but elliptical, the major axis marking an angle of 35 degrees with the vertical, and its higher extremity being inclined to the right. Upon putting on concave spectacles, by the assistance of which I saw objects distinctly with my right eye, I found that to my left eye a distant lucid point had the appearance of a well-defined line, corresponding in direction and nearly in length to the major axis of the ellipse above-mentioned. I found also that if I drew upon a paper two black lines crossing each other at right angles, and placed the paper in a proper position, and at a certain distance from the eye, one line was seen perfectly distinct, while the other was barely visible. Upon bringing the paper nearer to the eye, the line which was distinct now disappeared, and the other was seen very well-defined....My object was now to form a lens which should refract more powerfully in one certain plane, than those in the plane at right angles to it; and the first idea was to employ one whose surfaces should be cylindrical and concave, the axis of the cylinders crossing each other at right angles, and their radii being different.

This book should have considerable value as a reference book. It is highly recommended to the serious student of the history of vision science.

D.A.G.

Who is buried in Royal Tomb II at Vergina, Greece?

A research paper in the April 21, 2000, issue of Science magazine (Bartsiokas A. The eye injury of King Philip II and the skeletal evidence from Royal Tomb II at Vergina. Science 2000; 288: 511-514) and an accompanying news item (Koenig R. Is Alexander the Great's father missing, too? Science 2000; 288: 411) question whether the male occupant of Royal Tomb II in Vergina in northern Greece is actually Alexander the Great's father, King Philip II of Macedon, as was originally thought. This tomb was discovered by Greek archeologists in 1977. The supposition that Philip II was buried there was based on archeological evidence suggesting a date of about 336 B.C., the date of the assassination of Philip II. However, additional archeological evidence points to a later date closer to 317 B.C. This would suggest that the occupant of the tomb would be King Philip III Arrhidaeus, son of King Philip II and half-brother of Alexander the Great. Philip III Arrhidaeus was assassinated in 317 B.C. Bartsiokas examined the skeletal remains to try to make a correct identification.

Philip II was known to have been a warrior, but Philip III Arrhidaeus was not. Historical records note that Philip II had many wounds, including a broken right clavicle, an injury to the right femur, and a broken arm. There is no evidence of any of these injuries on the skeletal remains in the tomb.

This paper dealt specifically with potential evidence for orbital damage that would be consistent with the arrow wound that blinded Philip II's right eye at the siege of Methone in 354 B.C. Bartsiokas used macrophotography to study the orbital structure of the skeleton from the royal tomb. This was of particular interest because it was suggested based on an examination some 15 years ago that the skull showed signs of damage around the orbit. The study was complicated by the fact that the skeleton had undergone partial cremation.

Bartsiokas argues that there is no evidence of orbital injury, but that the asymmetries between the right and left sides of the skull were due to poor reconstruction. So Bartsiokas suggests that the occupant of the royal tomb was Philip III Arrhidaeus. He further speculated that some of the artifacts in the tomb may have been inherited by Philip III Arrhidaeus from his half-brother Alexander the Great. Alexander died in 323 B.C., and was buried in a now unknown location in Egypt.

D.A.G.

History of Australian journal noted:

In a guest editorial in the January-February, 2000, issue of Clinical and Experimental Optometry (volume 83, number 1, pages 1-3), its Editorial Board Chair, Barry L. Cole, discussed the journal's history and future directions. Clinical and Experimental Optometry is published by Optometrists Association Australia. Cole traced the origins of the journal to a 1913 publication of New South Wales optometrists which they initially called *The Journal*. (The history page at the website of Clinical and Experimental Optometry, www.optometrists.asn.au/ceo/history.html, states that the journal dates back to a publication entitled *Optical News* started in 1911 by the New South Wales Institute of Ophthalmic Opticians) Subsequent titles of the journal have been *The Optometrist of NSW* (1914), *The Commonwealth Optometrist* (1919), *The Australasian Journal of Optometry* (1929), *Australian Journal of Optometry* (1959), and *Clinical and Experimental Optometry* (1986).

Cole acknowledged the editors of the journal: Charles Kidman (1913-1920), W. G. Kett (1920-1962), J. Lloyd Hewett (1962-1980), Alan Johnston (1980-1985), Dan O'Leary (1985-1986), Brian Brown (1986-1990), Peter Swann (1992-1994), and H. Barry Collin (1994-present). Commenting on the future of the journal, Cole stated that it will be "continuing as a journal of scholarship reporting original research" and that, in addition, "its content will be diversified to increase its value for practising optometrists and to strengthen its role as a journal of archival record." Cole's statement in the editorial that the journal would soon "have a presence on the Internet" has been realized at www.optometrists.asn.au/ceo/.

D.A.G.

Jerry Abrams honored:

Long-time OHS member Jerry Abrams was honored by an executive order from Indianapolis mayor Bart Peterson proclaiming January 20, 2000 to be "Jerome J. Abrams Day" in the city of Indianapolis. The proclamation noted that January 19, 2000 was the fiftieth anniversary of his optometric practice on the West side of Indianapolis. The proclamation cited some of his many significant professional and community volunteer activities and contributions.

D.A.G.

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