I & Vision Research Centre

Through Space & Time – Huygens' Principle, Occupation, and Posthumous Prescription

Lenses & Gingko Leaves. Photo Credits: Cody King & Mike Murray

Posted 17 March 2023: https://www.linkedin.com/pulse/through-space-time-huygens-principle-occupation

Christiaan Huygens (1629 – 1695 CE, Netherlands) was one of the great figures of the Scientific Revolution, proposing the first theory on the nature of light. His techniques for grinding and polishing lenses allowed – for the first time – telescopic magnification and clarity great enough to prove the existence of rings around the planet Saturn. As a testament to his contributions to astronomy, a probe named after him was launched in 1997 by NASA and the ESA, parachuting down from the Cassini orbiter to the surface of the planet's moon Titan in 2005.

However, the telescopes produced to achieve this magnificent feat were poorly received and objectively inferior to competing products despite his polymathic brilliance.

A possible answer to this mystery was featured in an article by *Livescience* last week. Ironically, as one of the contributors to refraction theory, Huygens had an uncorrected refractive error of -1.5 diopters. Alexander Pietrow (2023) in his paper for *Royal Society* explains how this led to overmagnification of distant astronomical objects and low quality of Huygens products versus competitors, as they were designed for his uniquely but unknowningly myopic eyes only.

His father, also a high-achiever of the Dutch Golden Age, was a diagnosed high myope that refused to wear his spectacles when posing for any portraits. Although the genetic link is clear, we don't know for sure what contribution genetic, developmental, and occupational risk factors played in Huygens' eventual posthumous prescription. With this case in mind, one realises how hard it is to quantify the impact of uncorrected refractive error might have around the world. Of course our technology and healthcare has improved, but the fact that the craftsmanship and qualitative productivity of a man that was the first to lay eyes on the distant moon Titan with his own lens technology was professionally impacted by the refractive condition of his eyes is poignant.

The talented Huygens also prepared designs for an internal combustion engine that used gunpowder as fuel, but never built it. It may not be the best solution for high gas prices but a decent hybrid engine for a zombie apocalypse, depending on your context.

Occupational hazards and life paths associated with myopia progression are not limited to 17th Century European geniuses. Mass classroom-based education has been a turning point for myopia manifestation in populations around the world. Indoor work speeds up progression while predominance of near work increases the tendency of our ocular machinery to adapt to circumstance. Similar (evolutionary, species-level) mechanisms were at play during the time of the dinosaurs, with predators displaying higher visual acuity than blurry-eyed, flora-focused herbivores.

Occurrence of adult myopia is increasing. In earlier years, this was noticed in lab employees working with microscopes. Even further back, reportedly, a myth commonly described in eyecare circles is that of short-sighted Chinese scribes putting pressure on their eyelids at night to shorten the eyeballs. They may have had other myopia control medicines at hand, though unknowingly applied…

Ancient Myopia Ministrations: Emerald and Gold

Emperor Nero's (37 – 68 CE, Julio-Claudian Rome) age and the modern era associate eye health with the colour green. Nero's infamous emerald viewing glass for gladiator games was described by Pliny as having a most agreeable colour, as refreshing as the use of green beetles for the resting of engravers eyes. Of course it also helped that the jewel was concave, best for use in distant viewing by the shortsighted emperor.

And what about gold? It so happens that the Gingko tree, understood to be genetically immortal and widely used in traditional Chinese medicine, may in fact be a myopia control resource. In Hou *et al.* (2023), Gingko Biloba Extract (GBE) fortified mouse chow was found to increase choroidal blood perfusion, thus inhibiting one of the major mechanisms in murine lens-induced myopia progression. The study used early growth response 1 (EGR-1) gene expression to evaluate myopia suppression, with GBE identified as a strong activator, though less powerful than crocetin (found in saffron). Concentration as well as dosage levels for best results in mice and humans are presently unknown, and it is known that Gingko can be carcinogenic and hepatotoxic at high doses.

We recommended that you browse and enjoy pictures of the famous 1,400 year old Gingko tree, a "Maidenhair" of Gu Guanyin Buddhist Temple in China. Now we know there are benefits beyond the meditative beauty of its golden leaves, and, the tree species is believed to be over 200 million years old. You can think of it as looking far into the past, sharing a sight with dinosaurs of the Triassic and Jurassic period.

…Or at least sharing with the ones that could see properly.

Disclaimer: *The material presented is for informational and entertainment purposes only, in summary of recent news and events. It neither reflects the views nor constitutes professional advice of the organisation. The major sources used are referenced below.*

References & Further Reading

Baker, H. (2023, March 7). Renowned astronomer who discovered Saturn's largest moon was probably nearsighted, his telescopes show. *Livescience*. https://www.livescience.com/renowned-astronomer-who-discovered-saturns-largest-moon-was-probably-nearsighted-his-telescopes-show

Helmenstine, A. M. (2019, December 5). Biography of Christiaan Huygens, Prolific Scientist. *ThoughtCo*. https://www.thoughtco.com/christiaan-huygens-biography-4163997

Hou, J., Mori, K., Ikeda, Si. *et al.* (2023). Ginkgo biloba extracts improve choroidal circulation leading to suppression of myopia in mice. *Sci Rep 13, 3772*. https://doi.org/10.1038/s41598-023-30908-1

Jacewicz, N. (2015, July 7). What Did Nearsighted Humans Do Before Glasses?. *NPR.* https://www.npr.org/sections/health-shots/2016/07/07/484835077/what-did-nearsighted-humans-do-before-glasses

NASA Science Mission Directorate. (n.d.). *Huygens*. Solar System Exploration: Our Galactic Neighborhood. https://solarsystem.nasa.gov/missions/huygens/in-depth/

Nero's Emerald. (1926). *The British journal of ophthalmology*, *10*(9), 489 – 490. https://doi.org/10.1136/bjo.10.9.489

Pietrow A. G. M. (2023). Did Christiaan Huygens need glasses? A study of Huygens' telescope equations and tables. *Notes Rec*. http://doi.org/10.1098/rsnr.2022.0054

Woodward, A. (2022, August 11). The Fascinating Ginkgo Tree: A Sacred Plant of East Asia. *Vision Times*. https://www.visiontimes.com/2022/08/11/fascinating-ginkgo-tree.html

Wu, K. J. (2020, January 17). A Genetic Elixir of Life Helps Millennia-Old Ginkgo Trees Escape Death. *Smithsonian Magazine*. https://www.smithsonianmag.com/smart-news/thousands-year-old-ginkgo-trees-genetic-elixir-life-180974004/