

# **Eyeglasses - Correcting Vision thru the Centuries**



David A. Fleishman, MD

May 3, 2014

Charlotte, NC

# Let's Focus on the Human Eye

1. It is an amazing organ – in terms of how it works + what it does. Its evolution goes back 500 million years.
2. Sight is definitely cherished by absolutely everyone.
3. Eyeglasses, however, are taken for granted by nearly everyone.

**Yet vision aids have played a significant role for over 725 years. They are definitely underappreciated.**

# History – Famous People 1

The explanation for sight - how did the eye work?

- **Euclid** - 300 BC - Father of Geometry
- **Ptolemy** - (90 – 168 AD) - mathematician, astronomer, geographer
  - **Prevailing theories were that rays originated in the eyes, then reached objects, thus enabling seeing those objects.**
- **Alhacen** – (965 – 1040) – of the Islamic World – mathematician, optician, astronomer
  - **Explained that everything in the world emits light rays in all directions so these rays enter the eye**
  - Wrote the definitive book of optics (c. 1000), explaining how the eyes work – very rudimentary
  - Contributed to the vision theory and to the eventual understanding of the eye mechanism
  - **“Father of Modern Optics”**
  - **obviously the brain was involved too.**

# History – Famous People 2

- **Roger Bacon (1214 -1294)**, English Franciscan Friar



In his 1268 'Opus Majus', he noted that letters could be seen better and larger when viewed through less than half a sphere of glass (plano - convex). His experiments confirmed the principle of the convex lens (converging - magnifying), described by Alhacen.

**Bacon recognized this could assist weak eyes or vision of older persons.**

But it was felt to be a medical problem, and not an optical problem.

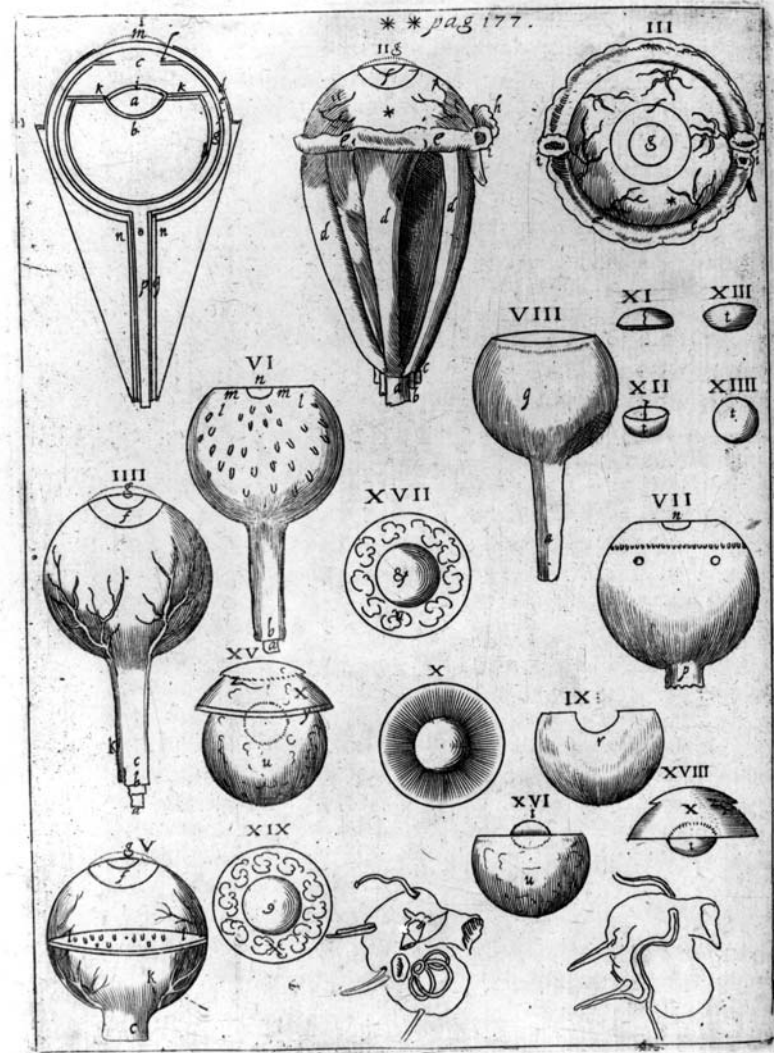


# History – Famous People 3

**Johannes Kepler (1571-1630) –**

**His major contribution to optics was in 1604 with the correct understanding of the optical functioning of the human eye** – how vision takes place. He was also first to recognize that images are projected inverted and reversed by the eye's lens onto the **retina (the true seat of vision)**.

**Pre-Kepler** - no actual understanding why convex lenses helped presbyopia—and, worse, how concave lenses helped myopia. These were refractive disorders. **Medieval and Renaissance theory held them as physiological/medical disorders based on inadequate flow of “visual spirit” to the visually sensitive lens (thought to be the seat of vision)**.



# Next: A Visual Tour Through History

A. Eyeglasses over the centuries

(from over 135,000 images)

B. Touch upon Famous Movies and TV Programs

# Earliest ground lenses



Layard/Nimrod Lens  
Oval rock crystal inlay  
870-612 BC

British Museum



Lothar Crystal  
c. 860

**For liturgical arts and crafts in the workshops of monasteries.  
roughly ground on a rotating surface  
There were also reading stones as early as the 9<sup>th</sup> century.  
But they were way too strong to be useful in spectacles**

# Ground and polished rock crystal



Arm reliquary  
Saint Bernward  
c. 1194  
Precious metal  
gemstones

Cathedral of Hildesheim  
Germany

Reliquaries  
glass windows  
for embellishment and  
decoration of art treasures



Cross of Bishop Bernward  
Processional Cross  
c. 1170-80

has a tiny fragment of the Holy Cross



Liturgical Fans  
c. 1140



Book cover with ivory figures  
before 1085

# 1286 Invention, Pisa Italy and afterwards



Kloster Wienhausen, Germany



Three of the earliest

Type 1 and type 2 and leather  
two are circa 1340

**Discovered in 1953,  
no examples had appeared  
prior to that date**



14<sup>th</sup>-15<sup>th</sup> c.  
Private  
collection



**Discovered in 2013**



# After 1286 – Pisa, Italy

## Anachronisms

### Vision aids seen in early art

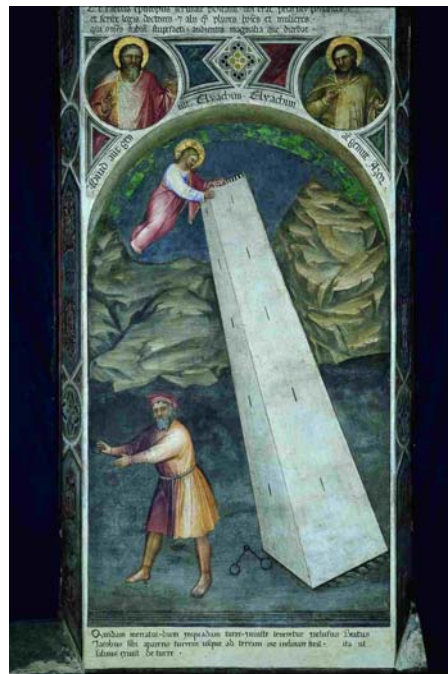
Dominican Seminary  
Basilica of San Niccolò  
Treviso, 1352, Tommaso Medina



Hugo de Provence  
rivet spectacles  
Type 1



Nicholas of Rouen  
dioptrical vision aid  
weak positive lens



Miracle of the Tower  
Basilica of St. Anthony  
1382

# 14<sup>th</sup> – 15<sup>th</sup> century

**Anachronisms** Glasses = knowledge, wisdom, intelligence, a learned scholar



Moses – Deventer Church



Moses  
Deutsche Bible



St. Luke  
c. 1400



First four Articles of the  
Apostles' Creed, circa 1500



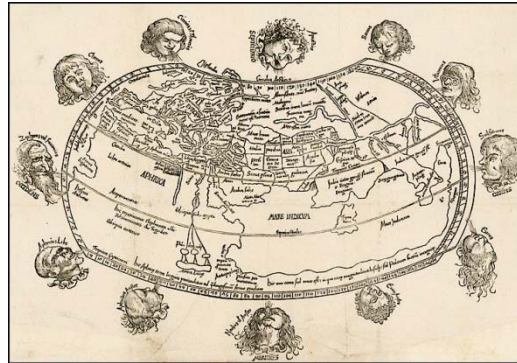
St. Peter  
"Garden of Eden"

MFA Boston

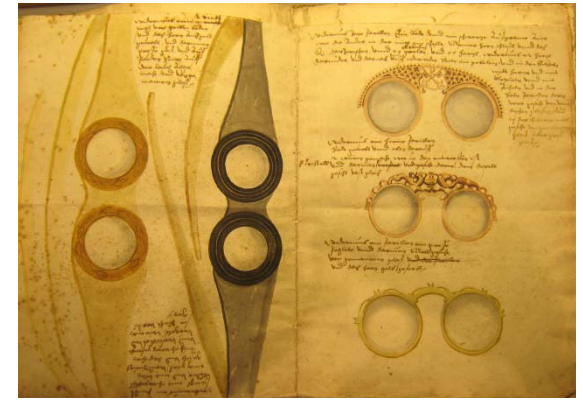
# 16<sup>th</sup> century



Cardinal  
Fernando Niño de Guevara  
El Greco, 1600  
ear loops



Earliest world map  
after Columbus  
Gregor Reisch, 1503



Regensburg Regulations  
first eyeglasses catalogue  
c. 1580



Hans Emmon 1523  
Nuremberg



Vulturnus, a windhead  
leather-framed specs



Gorg Hager 1591  
Nuremberg

# 17<sup>th</sup> century



\*Anachronism\*  
Unique, 1635



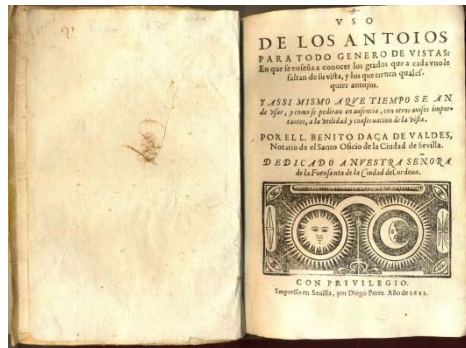
Carved ivory  
late 17<sup>th</sup> c



Woman wearing  
glasses, 1675



Masterpiece spectacles  
Heymann Collection  
Finest handcrafted objects



Daza de Valdes, 1623  
first book on spectacles  
Father of Optometry

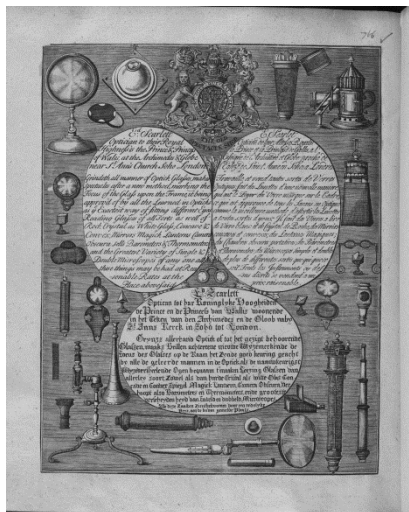


Spina frontalis

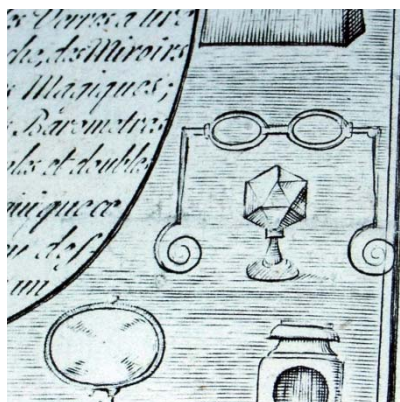


German National Museum  
(storage)

# 18<sup>th</sup> century



Edward Scarlett  
Trade card  
As early as 1714



Bodleian  
Library

Notice the spirals



Solid gold and enamel, c. 1800



Nuremberg, 1729, GNM



Solid gold, circa 1760

# 18<sup>th</sup> – 19<sup>th</sup> century



Washington > Lafayette

Smithsonian



protective goggles



1783 + 1797  
unique



Italian?, unique  
BOA Museum



Charles Peale, 1785-87



PAFA



Adam's Patent, 1797



Charles Peale, 1789  
"the last"



Philadelphia  
History Museum



Thorowgood Smith, 1808

# 19<sup>th</sup> century



Chinese folders  
with ear loops



McAllister  
round



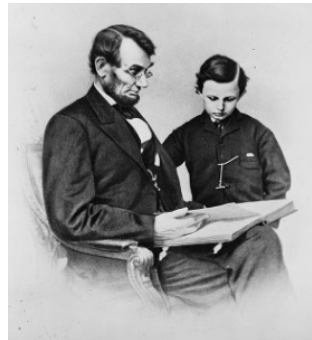
4 lens bifocals  
gold frame



Christopher Smith  
1839 patent



similar to Jefferson's  
1806, but for myopia  
No McAllister mark

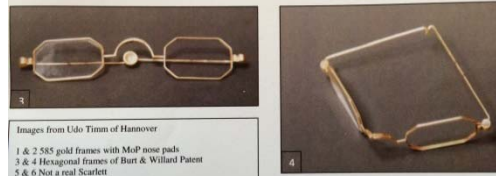


Waldstein all glass  
Musee Civilization



Smithsonian  
Drop-down-finials

**Two additional  
pairs have  
been found**



Solid gold, decorated  
Use by a French aristocrat

# 20<sup>th</sup> century



Leopold and Loeb  
1923



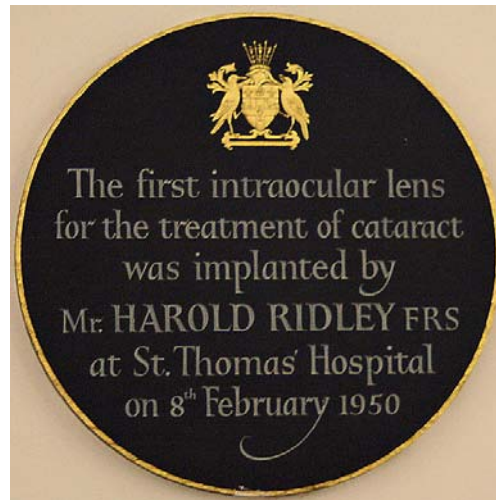
Harry Potter



Christian Dior



Elton John



Self-refracting glasses

# 20<sup>th</sup> – 21<sup>st</sup> Century



# One of my favorite quotes

on the website

- *"The art of making a pair of spectacles was an achievement of monumental significance for mankind that has had an incalculable impact. Although it has been relatively unknown to the general public, the evolution and development of spectacles over the past seven centuries qualifies as a long, significant, and quite fascinating journey through history, whose impact deserves to be better recognized and more widely appreciated."*

*Professor Spencer Discala, UMass Boston*

# Other Great Quotations 1

- 1268 Friar Roger Bacon monk ,scientist Opus Majus “If anyone examine letters or other minute objects through the medium of crystal or glass or other transparent substance, if it be shaped like the lesser segment of a sphere, with the convex side toward the eye, he will see the letters far better and they will seem larger to him. For this reason such an instrument is useful to old persons and to those with weak eyes for they can see any letter, however small, if magnified “
- 1306 Fra Giordano da Rivalto St. Catherine’s Dominican Monastery monk, in a sermon “It is not yet twenty years since there was found the art of making eyeglasses which make for good vision, one of the best arts and most necessary that the world has. So short a time is it since there was invented a new art that never existed. I have seen the man who first invented and created it and I have talked to him”
- 1313 Fra Allesandro della Spina St. Catherine’s Dominican Monastery monk, death notice “a monk of most excellent character and acute mind.....Whatever has been made, when he Spina saw it with his own eyes, he too knew how to make it; and when somebody else was the first to invent eyeglasses and was unwilling to communicate the invention to others, all by himself he made them and good-naturedly shared them with everybody.”
- 1583 George Bartisch eye specialist his book Ophthalmodoulea, first book on eye diseases “Man has two eyes – he needs not four” In fact, one chapter in his book is dedicated to the topic “How one should avoid spectacles and eyeglasses and should abstain from wearing them”
- 1660s Samuel Pepys civil servant - in his diary for December 1666  
..”after candlelight they begin to be sore and run, so that I intend to get some green spectacles.”

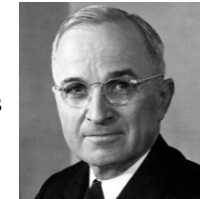
# Other Great Quotations 2

- **1776**    **John Hancock**    **Declaration of Independence**    “I sign my name so large and so plain that George the Third may read it without his spectacles” .....
- **1783**    **George Washington**    **The Newburgh Conspiracy**    "Gentlemen, you will permit me to put on my spectacles, for I have not only grown gray, but almost blind, in the service of my country.";    Further words choked in his throat and he turned and left. This humble statement brought shame to their souls and drew tears from many of the officers. The threat to democracy of a military coup evaporated thus guaranteeing the tradition that the military would remain subordinate to the civil authority.
- 1784-85    Benjamin Franklin    letters    “I therefore had formerly two pairs of spectacles, which I shifted occasionally, as in traveling I sometimes read, and often wanted to regard the prospects. Finding this change troublesome, and not always sufficiently ready, I had the glasses cut and a half of each kind associated in the same circle. By this means, as I wear my own spectacles constantly, I have only to move my eyes up or down, as I want to see distinctly far or near, the proper glasses being always ready."
- Circa 1900    George Washington Wells    a founder of AO    “We will spare no pains until every person who needs them shall have glasses of true scientific merit.”
- **1946**    **Vasco Ronchi**    **Physicist studied science of optics**    “Much has been written, from the serious to the humorous, about the invention of eyeglasses, but when it is all summed up, the fact remains that this world has found lenses on its nose without knowing whom to thank.”

# In the Movies and other Key Moments



1963 – Walter Cronkite, with tears in his eyes, took off his glasses and announced that Kennedy has been shot.



Harry Truman - known to have uncorrected vision of 20/50 and 20/400, very weak eyes



Marilyn Monroe - “How to Marry a Millionaire”  
girls who wear glasses

Name of the Rose (1980) Sean Connery as a monk solving a murder mystery set in an Italian monastery, in the 14<sup>th</sup> century (rivet spectacles)



Harry Potter (1997)



Twilight Zone (Nov 20, 1959) Rod Serling  
Burgess Meredith

Lord of the Flies (1963) William Golding book – Piggy’s glasses only means of starting a fire so he is captured and killed by Jack and his band of savage young boys



Chinatown (1974) Jack Nicholson – Faye Dunaway – John Houston  
glasses were the key to solving the crime



National Treasure (2004) – Nicholas Cage  
6 lens spectacles

