Gazing long into the Abyss: A History of Light Detection

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Biological Origins

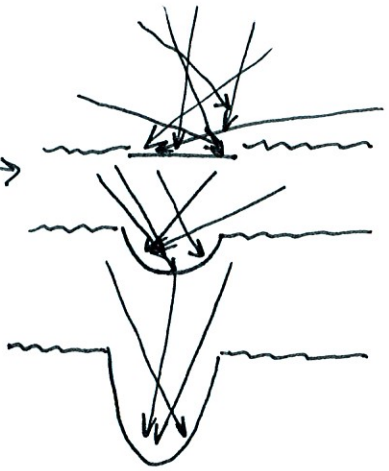
Humans
Plants & bacteria
↳ Earth formed 4.6 Billion years ago
800 Million years later, first Photosynthetic bacteria
↳ Chlorophyll predecessor pigments
2.7 By ago: Cyanobacteria
↳ visible light ⟹ oxygen

Aside:
What is a detector?

423 My ago: vascular plants
Phototropism

Eyes

eyespots
building blocks of vision
development of directional sensitivity



first eyes: lower Cambrian, 540 My ago
↳ 'Cambrian explosion'

Human Engineered Light Detection

Camera Obscura
- what is it?
- at least since ~~400~~ 4th Century BCE, possibly much earlier
- Mozi, 4th century BCE
- Aristotle, also 4th C. BCE
- Da Vinci, 1502

- uses
  ↳ drawing aid
  ↳ Astronomical projection

Sunprints

Define
1717 - Johann Schulze
1800 - Thomas Wedgwood

Photographs

Un-fixed early photos
First fixed photo - 1826/7 Niepce
First negative process - 1835 Henry Fox-Talbot
Daguerrotypes - 1839 ⇒ photography enters public consciousness
John Hirschel - better fixative, first glass negative

Astrophotography

Technical challenges
Early attempts - moon
Advances w/ dry plate photography
Early 20th Century: Telescopes designed specifically for photography

Into the digital Era

- predecessor devices
- CCD
  - Bell labs, 1969, 8 pixels
  - 1971, imaging
  - 1974, 1000 pixel device ⇒ 1975, first Kodak camera w/ CCD

How does a CCD work?

↳ photoelectric effect, "charge buckets"

In Telescopes

Cryogenic temperatures
Ultra-large focal planes
LSST - Large Synoptic Survey Telescope