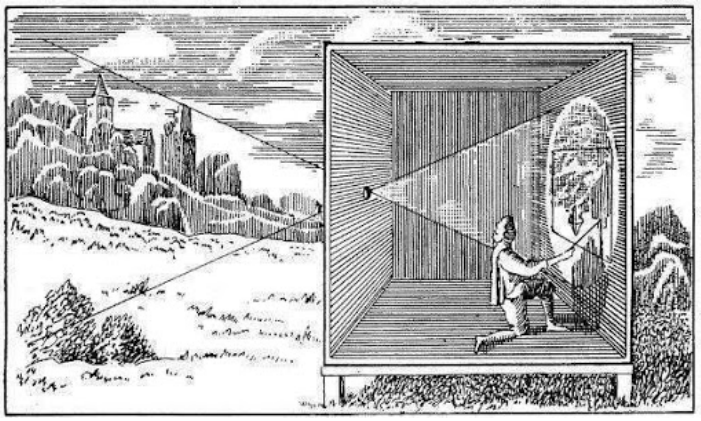
CAMERA OBSCURA
TIMATATANGA HOU
WHANGAREI

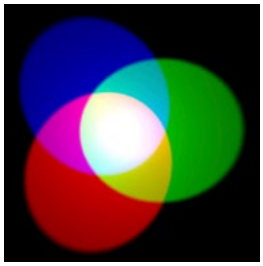
Timatatanga Hou Camera Obscura: how does it work & how has it been used through history to today

How does a camera obscura work?
...for the curious



Engraving in Athanasius Kircher's 'Ars Magna Lucis Et Umbrae'(1645)

The name *camera obscūra* comes from Latin and means a dark chamber and people have been making them in various forms for hundreds of years. They are simply a lightproof box or room with a hole in one side. Light from the sun reflects off objects outside the camera obscura and passes through the hole and lights up the surfaces inside the room with an image of the outside view.

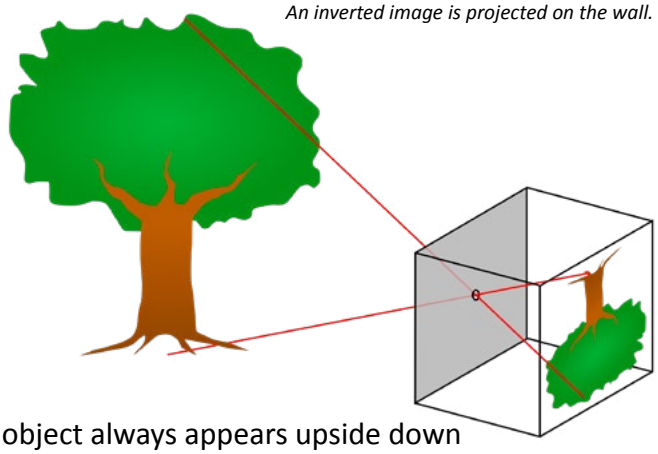


Usually the coloured light reflecting off objects gets mixed up with all the different coloured light reflecting off other objects around us and, believe it or not, when all this coloured light is mixed together it becomes 'white light' like sunlight. This is why the colours in light are usually invisible to us.

Coloured light mixed together becomes white light

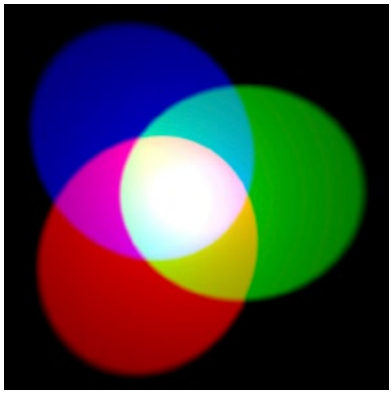
Light travels in straight lines and so only some of it can get through the hole in the side of the camera obscura. When the hole is small and perfectly round (or has a glass lens in it) only the coloured light coming directly off each object can get through. This means it doesn't get mixed up with other colours and so it doesn't become invisible white light. That is why we can see an image, in full colour, where it strikes the wall inside the camera obscura.

An inverted image is projected on the wall.



Because the light is travelling in straight lines the object always appears upside down and back to front on the walls. This is basically how all cameras work…even your phone camera!

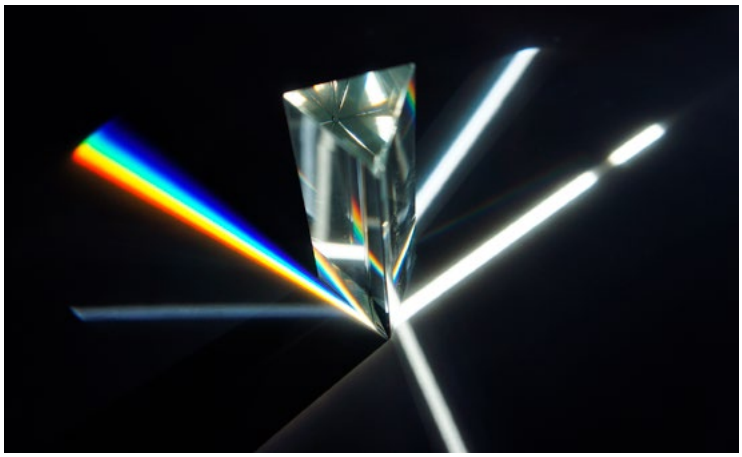
...extra info (for experts)



Additive colour mixing

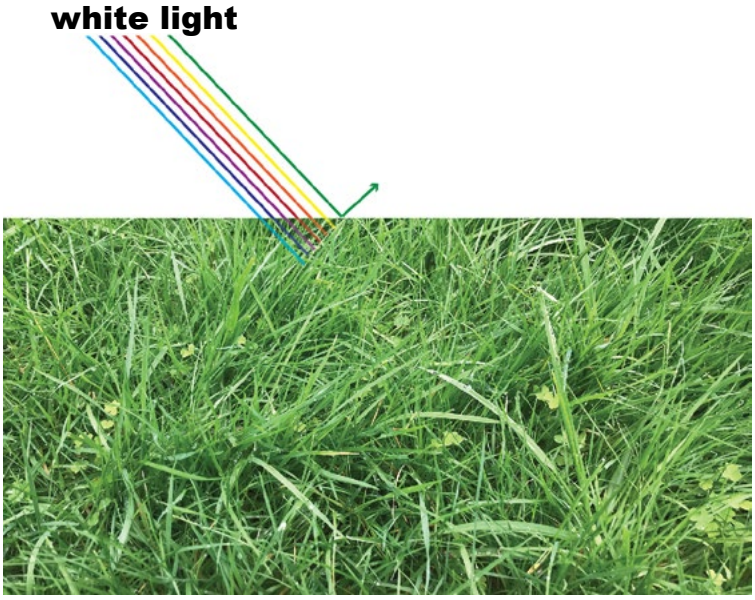
When all colours of light are mixed it becomes white light and this is called additive colour mixing.

When white light is split up (refracted) it splits back into separate colours again – this is how a rainbow or prism works.

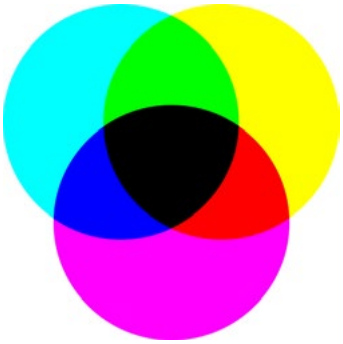


Prism refracting light

The grass looks green to us because it is absorbing all the colours in the white light except green which it is reflecting back into our eyes.



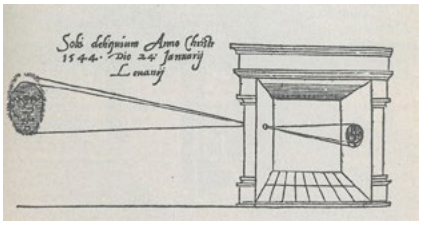
When coloured pigments like paint have all the colours mixed they turn a muddy dark colour (and not white like light does) and this is called subractive colour mixing



Subractive colour mixing

...the camera obscura through history to today

Chinese texts from the fifth century BC (400s BC) are the earliest written records we have that mention the optical effects produced by light passing through a pinhole (upside down and back to front projected images). For centuries this phenomena was mostly used as a way to observe solar eclipses that couldn't be viewed by looking directly at the sun (staring at the sun damages your eyes).



By the sixteenth century (1500s) pinholes were being used for a variety of scientific, astronomical and time telling purposes. The earliest known drawing of a room built for a working pinhole (a camera obscura) was by astronomver Gemma Frisius which he published in 1545 to show how he used it to study a solar eclipse.

Illustration by Gemma Frisius 1545

A pinhole placed by astronomer Paolo Toscanelli in the Cathedral of Florence (in 1475) still exists and projects an image on to marked slabs on the cathedral floor at the exact time of the summer solstice each year.

By the seventeenth century (1600s) artists were using camera obscura (a room, a tent or a box) with a lens inserted in the pinhole. The lens let in more light and made the image bright enough to trace an image of the scene that the camera obscura was facing.

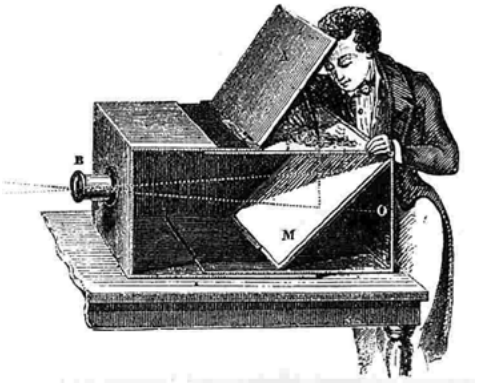
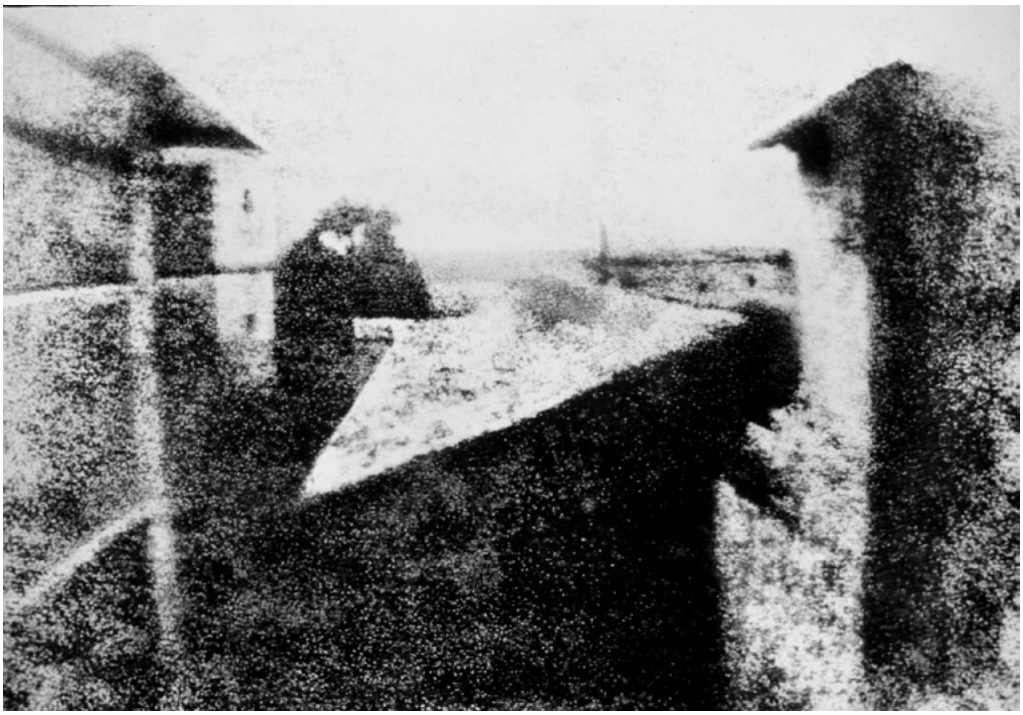


Illustration of a camera obscura box for drawing circa 1700s, artist unknown

During the nineteenth century (1800s), and with the rapid growth of technology from the Industrial Revolution, light sensitive chemicals were discovered that could be painted on to a glass or metal surface. When these light sensitive plates were placed in the back of a camera(obscura) an image could be captured and fixed…a photograph!



First surviving photograph - by Nicephore Niepce 1825

In the late 1800s large camera obscura rooms became popular as a form of entertainment in Europe and USA and were often built as a seaside attraction or a folly in a castle turret.
Some of these original camera obscura are still in use today and can be easily found online:

Great Union Camera at Douglas on Isle of Man

Camera Obscura at Royal Mile, Edinburgh

Clifton Observatory at Bristol, England

Giant Camera at Cliff House, San Francisco

The twentieth century (1900s) saw the rapid rise of the modern camera using film and then the digital processes in cameras that we all use today. Our fascination with the magic of optics and capturing light has meant that interest in the pinhole, or the lens-less camera, has never died and is still used by artists, photographers and enthusiasts today.

Here are some local and international artists who use the camera obscura to make images (find out more about them online).

© Abelardo Morell (Cuba) *Central Park* 2008

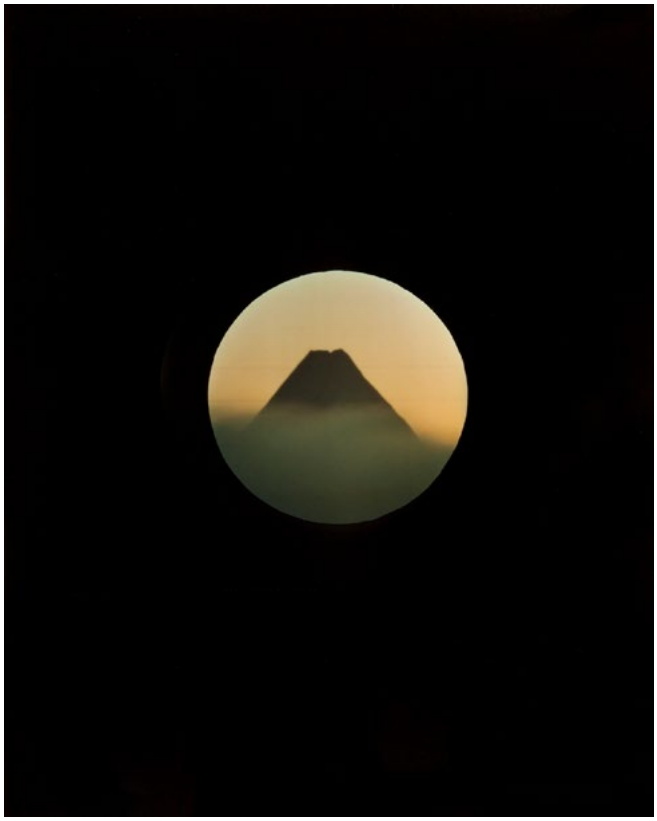
© Ilan Wolff (Israel) *Holstower* 2011

© Marga Pirilä (Finland) *Anu in Tampere* 2004

© Doug Spowart & Victoria Cooper (Australia) *Avochie Cottage 2009*

© Jenny Tomlin (Aotearoa/NZ) *Matarik*i 2014

© Diane Stoppard (Aotearoa/NZ) *Tutukaka* 2019



© Darren Glass (Aotearoa/NZ) *Ngauruhoe AM #4* 2008

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