Chapter 6
Splashing colors everywhere, like a rainbow
(optics)

Here are the references and web links for the stories in the book. Recently added references are highlighted. For updates to those stories and for all the new stories, go to
http://www.flyingcircusofphysics.com/News/NewsDetail.aspx?NewsID=42

Jan 2015

6.1 Rainbows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.
The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Photos and discussions
http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.

Videos:
http://www.youtube.com/watch?v=z3iOjTqFGWY&mode=related&search= Double rainbows plus lightning
http://www.youtube.com/watch?v=ZmVuO-qQOn8 Primary rainbow plus faint secondary bow
http://www.youtube.com/watch?v=cylV9Lp9fuM&mode=related&search= Double rainbow

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Book reference style: author, title, publisher, date, pages

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6.2 Strange rainbows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006. Find the entry for March 8, 2007 for a photograph of a reflected rainbow.

Moonbow photos and descriptions:
http://uweb.txstate.edu/~do01/ Don Olson site
http://thruthefinder.com/picture.php?gallery=naturescapes&index=51 Jia Liu photo
http://thruthefinder.com/picture.php?gallery=naturescapes&index=42 Another Jia Liu photo
http://epod.usra.edu/archive/epodviewer.php3?oid=236096
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Also see references for preceding item.

6.3 Artificial rainbows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006. There is a glass bead bow photo and description under Sunday, May 14, 2006

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6.4 The daytime sky is not dark

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.5 Colors of the sky

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http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics

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6.6 Blue mountains, white mountains, and red clouds

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6.7 Sailor's warning

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6.8 Sunsets and volcanoes

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6.9 Bishop's ring

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.

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6.10 Cloud-contrast bow

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.11 Sky colors during a solar eclipse

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.12 When the sky turns green, head for the cellar

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Photos

http://www.stormeyes.org/tornado/SkyPix/tuliacg.htm
http://ww2010.atmos.uiuc.edu/guides/crclm/prjct/strm93/gifs/strt2.gif

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6.13 Enhancement of overhead blue

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6.14 Dark patch and rosy border during sunset

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.15 Bright and dark shafts across the sky

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http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.

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6.16 Blue haze, red haze, brown haze

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.17 Lights of a distant city

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6.18 How far is the horizon?

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.19 Color of overcast sky

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6.20 Maps in the sky

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http://www.athropolis.com/arctic-facts/fact-ice-blink.htm Photos of ice blink (or water sky). They are not clear but that is the nature of the effect.
http://www-evasion.imag.fr/Membres/Fabrice.Neyret/NaturalScenes/clouds-sky-sun/sky-radios-sun/iceblink_large.jpg Photo

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6.21 Brighter when it snows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.22 The end of a searchlight beam

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.star.le.ac.uk/~dbl/cfdsdisk/cfdsdisk/Skybeams/ Photos. See the third and fourth images for the University of Kent Canterbury

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6.23 Short story: Newgrange winter-solstice sunbeam

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Videos

http://www.youtube.com/watch?v=ywLrT8b6tY4 Light from the rising sun at the winter solstice penetrates the passage to the central chamber.

http://www.youtube.com/watch?v=DbKkwCx5zyM&mode=related&search= Video montage

Photos

http://www.travelsinireland.com/ireland/newgrang.htm Photos and information of Newgrange

http://www.global-vision.org/ireland/stones/index.html Photos, including the beam inside Newgrange

http://ca.geocities.com/merlino2k/ More photos

http://web.mit.edu/planning/www/mithenge.html Photos and discussion of the sunbeam stream along the "infinite corridor" of MIT

http://futureboy.us/mithenge/ Discussion and calculation results for the MIT observations

http://www.boston.com/news/local/massachusetts/articles/2007/02/04/yow_its_a_geeky_eureka_as_miters_see_the_light/ Boston Globe account of the MIT observations

http://docbug.com/blog/archives/268/mithenge-yourst.jpg Photo of MIT observation

http://upload.wikimedia.org/wikipedia/en/thumb/9/94/MIThenge.jpg/180px-MIThenge.jpg Another photo

http://www-tech.mit.edu/V124/N53/12mithengebriand.53p.html Nice photo of the MIT observation

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6.24 The green flash

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://zapatopi.net/kelvin/papers/blue_ray_of_sunrise.html Lord Kelvin's observation of the blue flash
http://www.intersoft.it/galaxlux/GreenFlashGallery.htm Many photos of flashes of various colors, also of sun distortions
http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://mintaka.sdsu.edu/GF/pictures.html Contains many links to photos of the green flash
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.
http://www.exo.net/~pauld/physics/atmospheric_optics/green_flash.html
http://virtual.finland.fi/netcomm/news/showarticle.asp?intNWSAID=26137
http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena

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6.25 Distortions of the low sun

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.intersoft.it/galaxlux/GreenFlashGallery.htm
http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://mintaka.sdsu.edu/GF/explain/simulations/inf-mir/Kaplan_photos.html Photos of solar mirage

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6.26 Red Moon during lunar eclipse

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.mreclipse.com/LEphoto/LEgallery1/LEgallery2.html Scroll down to the red moon during totality.

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6.27 Crown flash

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6.28 Oasis mirage

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=Sg3rLpWaFDU&feature=related Watch the horizon
http://virtual.finland.fi/netcomm/news/showarticle.asp?intNWSAID=25722
http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena
http://www.youtube.com/watch?v=gaGO-we-Fag&mode=related&search= Video of the supersonic car Thrust SSC. Note the mirage due to the light coming across the desert ground.
http://ctein.com/STS1_in_Desert.jpg Mirage of space shuttle on desert floor
http://www.phys.ufl.edu/~avery/course/3400/atmosphere/mirage_inf_lynch.jpg Car on a hot street
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See the references for item 6.30.

6.29 Wall mirage

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://greatestplaces.org/mirage/reports/tim.htm Description and a sketch of a wall mirage.

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See many more references, see those for the next item.

6.30 Water monsters, mermen, and large-scale mirage

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://tpemiragesg3.free.fr/fata.htm Fata Morgana, really good
http://virtual.finland.fi/netcomm/news/showarticle.asp?intNWSAID=25722
http://atmospherical.blogspot.com/search?updated-min=2006-01-01T00%3A00%3A00Z&updated-max=2007-01-01T00%3A00%3A00Z&max-results=50 Blog devoted to photos of atmospheric phenomena
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.
http://www.crystalinks.com/mirage.html Good photos, especially of the large-scale mirage
http://ctein.com/STS1_in_Desert.jpg Mirage of space shuttle on desert floor
http://www.phys.ufl.edu/~avery/course/3400/gallery/gallery_atmosphere.html Photos
http://epod.usra.edu/archive/epodviewer.php3?oid=38560 Mirage over water
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6.31 A ghost among the flowers

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.32 Shimmy and twinkling stars

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6.33 Shadow bands

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http://www.strickling.net/shadowbands.htm
http://www.science-frontiers.com/sf123/sf123p04.htm
http://www.liv.ac.uk/~ggastro/ES.obs.html
http://www.youtube.com/watch?v=Y0EhEKetT0I Video, I cannot see the bands but I can see the pinhole images

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6.34 The 22° halo and sun dogs

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=kvI6YuvpSWY&feature=related Halos appear as clouds move through the appropriate region of the sky
http://www.youtube.com/watch?v=o8h9AXFVIKg&feature=related sun dogs, as clouds move through the correct region
http://www.youtube.com/watch?v=NGkNLkryKDc&feature=related
http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://hyperphysics.phy-astr.gsu.edu/hbase/atmos/atmoscon.html#c1
http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/ice/sd.rxml Photo and diagram of how the light rays pass through the falling ice crystals
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See the references for the following item.

6.35 A sky full of halos, arcs, and spots

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Videos
http://www.youtube.com/watch?v=RxKlNa4gDOw&NR=1 very nice animation showing the various arcs that appear, as a function of the sun's elevation
http://www.youtube.com/watch?v=qrh_fxKwBlM&feature=related I cannot explain this display
http://www.youtube.com/watch?v=y1mGWLxwrgc
http://www.youtube.com/watch?v=dWZfYEhVwQo
http://www.youtube.com/watch?v=gkG7AZdFrXo
http://www.youtube.com/watch?v=BSG8KXjvyQM
http://www.youtube.com/watch?v=E7ERoddsTJw&NR=1
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Photos
http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://ww2010.atmos.uiuc.edu/(Gh)/guides/mtr/opt/ice/sd.rxml Photo and diagram of how the light rays pass through the falling ice crystals
http://hyperphysics.phy-astr.gsu.edu/hbase/atmos/atmoscon.html#c1
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6.36 Mountain shadows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://www.exo.net/~pauld/lectures/patternscostarica/patternsnature2004.htm Scroll down to the mountain shadow photo---all mountain shadows are triangular

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6.37 Disappearing cloud shadows

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6.38 Colors of the ocean

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6.39 Reflection glitter of Sun and Moon

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.polarimage.fi/sea/glitter.htm several glitter paths
http://home.clara.net/rfleet/gbh/gltpath5.html Spider web glitter paths on crops

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6.40 Rings of light

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Comments

http://www.taylor-arts.com/images/gallery/SquaredWaterI.jpg Photo of mast. Note the squiggles and rings and isolated patches

http://barbhenry.vox.com/ Scroll down to the water reflection photo

http://www.birddigiscoping.com/blognorthshov.jpg photo

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6.41 Shadows and colors in water

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.42 Color of your shadow

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6.43 Seeing the dark part of the Moon

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6.44 Heiligenschein and opposition brightening

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http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://home.clara.net/rfleet/gbh/helig1.html
http://www.engl.paraselene.de/html/opposition_effect.html Lots of photos; use the menu. Look at the bright region around the head
http://www.engl.paraselene.de/html/sylvanshine.html

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6.45 Grain field waves

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=BP44VN5u38o Video of grain field in a breeze

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6.46 Glory

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.
The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://www.photodesk.iconbar.com/gal/sun/glory.shtml
http://www.astro.uiuc.edu/~kaler/arc/sk041202.html
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.

http://www.youtube.com/watch?v=ZTLN4GL0DEA Video of the glory (not heiligenschein as the video suggests)

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6.47 Corona

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.
http://home.hiwaay.net/~krcool/Astro/moon/moonring/ Photos and information
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6.48 Frosty glass corona

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.49 Iridescent clouds

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006.

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Also see the item about nacreous clouds.

6.50 Blue moon

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.
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6.51 Yellow fog lights

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.52 Dark when wet

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http://kootenay-lake.ca/beach/wetdry/index.html Photos plus explanation

http://www.weather.gov.hk/education/edu06nature/ele_beach_e.htm photos and essays. The last diagram is a little misleading because light cannot take such a long route through the sand.

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6.53 Colors of snow and ice

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=KZlv1HHDG2s Video, showing the color inside a snow cave
http://www.awi-bremerhaven.de/Meereis/gruener-eisberg-e.html Photos and discussion of green icebergs. Click on the first photo.
http://www.csam.montclair.edu/earth/eesweb/brachfeld/NBP0101.html Scroll down to the green iceberg photo
http://www.hickerphoto.com/iceberg-5896-photomug.htm Photo

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6.54 Firnspiegel and snow sparkles

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6.55 Whiteouts and snowblindness

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6.56 Yellow ski glasses

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6.57 When the ice grows dark

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6.58 Bright clouds, dark clouds

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6.59 Noctilucent clouds

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http://www.youtube.com/watch?v=pslcQXWQz3k Video of the ghostly clouds
http://science.nasa.gov/headlines/y2003/19feb_nlc.htm Photos and description. Scroll down to the diagram that shows how the clouds are illuminated.
http://aim.hamptonu.edu/outreach/gallery/3-1-08img.html Lots of photos
http://apod.nasa.gov/apod/ap990726.html Photo plus brief description
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http://www.brianwhittaker.com/nlc/NLC%20general/n-2005/www-BrianWhittaker-com-NLC-800.jpg Photo from a cockpit
http://math.ucr.edu/home/baez/diary/noctilucent.jpg Photo
http://www.britastro.org/iandi/gavin04.htm Photos
http://www.atm.helsinki.fi/~tpnousia/gengal/nlc.html Photo, NLC over Helsinki

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6.60 You in a looking glass

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.metacafe.com/watch/876063/hilarious_mirror_prank/

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

www.munch-raisonne.com
You can see the painting *Girls on the Pier* by Munch

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http://fog.ccsf.cc.ca.us/~tbardin/html/pepperghost.html David Wall’s page on how to set up Pepper’s ghost
http://www.doombuggies.com/secrets_attic.htm Disney’s Haunted House illusions
http://www.phantasmechanics.com/pepper.html Hotel Lugosi
http://www.youtube.com/watch?v=L7lJbXLRFYQ How to set up Pepper’s ghost with a DVD player, TV, and reflecting plastic, all for Halloween

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://webplaza.pt.lu/public/fklaess/pix/atc/general_view3.jpg

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6.64 Images in two or three mirrors

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=W-1s0VUdi7E Video of child with multiple images
http://www.umpi.maine.edu/info/nmms/mirrors.htm "Infinity mirrors"

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See the references to the next item.

6.65 Kaleidoscopes

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.
The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=hWYk_K7T3a8 Video about building big kaleidoscopes
http://www.youtube.com/watch?v=LrxNz63cXNQ Video, looking into a kaleidoscope
http://www.youtube.com/watch?v=ZpyOmzOQBnw Kaleidoscope that is sound activated
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6.66 Mirror labyrinths

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Videos
http://www.youtube.com/watch?v=M5xySAVyOj4
http://www.youtube.com/watch?v=F6nxBHrKwQU Adrian Fisher explaining the London Dungeon Mirror Maze
http://www.youtube.com/watch?v=rumrsXbYqGU The Edinburgh Dungeon Mirror Maze
http://www.youtube.com/watch?v=dp2xqLdWLtE
http://www.youtube.com/watch?v=xe48UrlygTo

Photos
http://www.mirrormaze.com/ Some of Adrian Fisher’s mirror mazes
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Mirror maze that once stood at Lucerne, Switzerland
http://www.mirrormaze.com/mackinaw_mirror_maze.htm

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http://www.colourblind.ca/images/20050807233841_shiny_sphere.jpg Relflection from a single ball
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6.69 Shiny turns to black; blacker than black

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6.71 Short Story: Landing in the dark behind enemy lines

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

References

See references to the preceding item.

6.72 One-way mirror

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http://www.midlandsres.com/Pictures_of_MMR_office_012.jpg

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6.73 Rear-view mirror

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6.74 Side-view mirror

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6.75 *A Bar at the Folies-Bergère*

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6.76 Renaissance art and optical projectors

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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http://webexhibits.org/hockneyoptics/post/stork.html David Stork's analysis of a van Eyck painting
http://webexhibits.org/hockneyoptics/post/falcograves3.html Discussion between Charles Falco and David Stork

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6.77 Anamorphic art

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.artlex.com/ArtLex/a/images/anamor_snowflake.lg.jpg Example using cylindrical mirror

http://www.unipd.it/vallisneri/en/instruments/6.html
http://oozandoz.com/images/mirror-cup-press.jpg
http://graphicfacilitation.blogs.com/pages/2005/06/anamorphic_pave.html Amazing anamorpic art on a sidewalk by Julian Beever
http://www.linesandcolors.com/2005/09/23/julian-beever/ Another amazing sidewalk example by Julian Beever
http://video.google.com/videoplay?docid=2885514567424950512&q=anamorphic Video about the sidewalk art of Julian Beever
http://www.youtube.com/watch?v=LVWkNlyCJtI Video Julian Beever
http://www.youtube.com/watch?v=hfn8Dz_13Ms Video shows how Beever sets up the art.
http://www.youtube.com/watch?v=IZ41c6omVWk Beever meets the Transformers, for the new movie
http://www.youtube.com/watch?v=dUen_khSouw Another video about Beever
http://www.youtube.com/watch?v=15oIzkWO-wU
http://www.youtube.com/watch?v=PQMmxWq_-pE Stunning, watch it come “alive”
http://www.youtube.com/watch?v=XjfVyx3PiZQ Another video showing how Beever sets up a drawing
http://www.youtube.com/watch?v=xVsKTwcBcMg Anamorphic art on a LCD screen
http://www.artlex.com/ArtLex/An.html Discussion plus some examples
http://www.neatorama.com/2006/05/10/kelly-m-houles-anamorphic-art/ Reflection anamorphic art
http://www.mathsyear2000.co.uk/explorer/anamorphic/cylmirror.shtml
http://www.youtube.com/watch?v=v-VKEVHL-8Y Hong Kong pavement art

http://www.julianvossandreae.com/work.html *Quantum man* by Julian Voss-Andreae. Click on "archive"; choose "Matter Wave Project II", click on one of the slides and then use the "Next" arrow at the top to go to the next slide.

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6.78 The bright and dark of streetlamps

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6.79 Multiple images from double-pane windows

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.80 World's most powerful searchlight

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6.81 Archimedes death ray

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Videos: sunlight is concentrated by an array of tilted planar (flat) mirrors:
http://www.youtube.com/watch?v=RQUrD6jp8-w
http://www.youtube.com/watch?v=vaIw_9ZLvcI
http://www.youtube.com/watch?v=iuORGNBKV7o
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Photos and discussion:
http://web.mit.edu/2.009_gallery/www/2005_other/archimedes/10_ArchimedesResult.html Feasibility study by MIT

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6.82 Short Story: Illuminating a referee

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http://www.bartenbach.com/en/ The company Bartenbach LichtLabor, in English.
http://www.bartenbach.com/ The same site but in German

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6.83 Spooky lights in a graveyard

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6.84 What a fisherman sees of a fish

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.85 What a fish sees of the fisherman

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http://www.youtube.com/watch?v=cIIwwCi2zwk vision from a bathtub of water
http://curiousphotos.blogspot.com/2007/07/curious-add-on-07-14-07.html Scroll down to reach a photo shot from within the water in the swimming pool. You might also notice the photos shot looking down into the water. Refraction distorts those images also.

more links
Videos of archer fish
http://www.youtube.com/watch?v=fhBZ40jIo4Q http://www.youtube.com/watch?v=Cc-Hm3zxHDI
http://video.google.com/videoplay?docid=3360632473266152205&q=archer+fish&hl=en Note how the fish anticipates where the insect will reach the water.

Photos of archer fish
http://www.biologie.uni-freiburg.de/data/bio1/schuster/images/archer.jpg
http://photo.net/bboard-uploads/00EsBI-27543584.jpg
http://cache.eb.com/eb/image?id=5814&rendTypeId=4

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6.86 Reading through a sealed envelope

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6.87 Short Story: Sword swallowing and esophagoscopy

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http://www.leapfrog-entertainment.com/Artists/Big/BradB/BradB.htm Photo of sword swallowing
http://www.youtube.com/watch?v=YxgEitL4YqQ Video of sword swallowing

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6.88 Shower-door optics

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http://www.ilovemuseumglass.com/aboutmuseumglass.asp museum glass discussion

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6.90 The invisible man and transparent animals

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6.98 Patterns from a glass of wine, a window, and a drop of water

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http://www.physics.wsu.edu/msoptoelectron/philip_marston.htm Philip Marston's site, including a lovely diffraction catastrophe produced by a water drop
http://fizyka.phys.put.poznan.pl/~pieransk/Physics%20Around%20Us/Physics%20around%20us.html
http://www.phy.bris.ac.uk/people/berry_mv/gallery.html The website of Michael Berry, an expert on optical catastrophe theory (caustics).

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6.99 Shadows with bright borders and bands

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www-chaos.engr.utk.edu/~kde/birds/pics/insects/kde.water_strider.09june2001-utktg.01.jpg Photo: Look at the shadows below the legs of this water strider.
http://www.microscopy-uk.org.uk/mag/indexmag.html?http://www.microscopy-uk.org.uk/mag/artaug03/iwheath.html Scroll down to the water strider photo. See how indentations in the water? They cause the shadows in the photo of the preceding link.

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6.100 Bright and dark bands over the wing

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.101 Short story: Shock waves from the *Thrust SSC* car

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

Photos

http://www.y1y1.com/data/media/166/ThrustSSC_4.jpg The distortions just above the care reveal four shock waves

http://freespace.virgin.net/john.coppinger/thrustss.htm Scroll down to the aerial shot, which shows the shock wave traveling along with the car.

Videos

http://www.youtube.com/watch?v=LKQ-xj5C2m8 The car Thurst SSC breaks the sound barrier and sets the land speed record. Montage of images of the car, its preparation, and the actual runs, including audio. You can hear the car's sonic boom!

http://www.youtube.com/watch?v=gaGO-we-Fag&mode=related&search= Soon after the supersonic car passes the camera, we hear the shock wave.

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6.102 Pinhole and pinspeck cameras

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.metacafe.com/watch/884241/matchbox_camera/ How to make a pinhole camera from a matchbox

http://photo.net/learn/pinhole/pinhole

http://www.wesjones.com/pinhole.htm My aritcle in Scientific American about pinhole and pinspeck cameras

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6.103 Solar images beneath a tree

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.104 Lights through a screen, lines between fingers

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6.105 Bright scratches and colorful webs

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6.106 Bright streaks in a car windshield

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.107 Reflections from a phonograph record

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.108 Colors on finely grooved items

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.uwgb.edu/dutchs/acstalks/acscolor/CDCOLOR.jpg

http://shokabo.co.jp/sp_e/optical/labo/refref/030695.jpg Photo of bright lanes on illuminated CD

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6.109 Anticounterfeiting: Optically variable devices

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

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6.110 Colored rings from a misty or dusty mirror

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6.111 Color of milk in water

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6.112 Color of campfire smoke

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6.113 Ouzo effect

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6.114 Colors of oil slicks, soap films, and metal cooking pots

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http://www.funsci.com/fun3_en/exper2/exper2.htm At midheight, swirling varies the film thickness and thus also the colors. Note that the film is whitish higher up, where it is thiner, and it is black where the thickness is even less (less than the wavelength of visible light).
http://sol.sci.uop.edu/~jfalward/physics17/chapter11/chapter11.html

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6.115 Structural colors of insects, fish, birds, and monkey butts

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http://www.youtube.com/watch?v=bG96K14bAvA Nice video, showing the change in color as a Morpho butterfly opens its wings.

http://www.youtube.com/watch?v=OaXAB3vUEyk Video, morpho butterfly. Colors are a bit washed out but you can still see them change with the angle of view is changed.
http://www.youtube.com/watch?v=INXo0hD8WNY Video, morpho butterfly.
http://www.kitcarmag.com/featuredvehicles/142_0303_diablo_1_c_s.jpg Photo, iridescent car paint
http://www.sfondideldesktop.com/Images-Animals/Baboon/Mandrill-Baboon-Face-Closeup-0.Jpg
Mandrill baboon face showing the blue due to the scattering and interference of light by the collagen in the skin.
http://www.naturalsciences.org/education/Belize/gallery/morpho.html Note the blue on the top of the wing and the brown on the bottom. The top should be brown also.
http://www.ivyhall.district96.k12.il.us/4th/kkhp/1insects/hercbeetle.html Hercules beetles
http://wastedspacewastedtime.blogspot.com/2006/05/six-spotted-tiger-beetle.html Tiger beetles
http://www.mikelevin.com/PeacockFeathers1024.jpg Peacock feathers
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Damselfly

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6.116 Pearls

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.117 Protuberances on insect eyes and stealth aircraft

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http://chem.sci.gu.edu.au/spm/images/biology/biology.htm Scroll down to "Ommatidia of moth's eye …" and then go back to the top and click on "Biology 2."
http://msc.eldoc.ub.rug.nl/root/PalasantzasG/2006/ProcRSocBStavenga/ Summary of research paper
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6.118 Iridescent plants

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6.119 Anticounterfeiting: Color-shifting inks

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6.120 Color saturation in flower petals

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6.121 Yellow brilliance of aspen trees

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6.122 Colors of eyes

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6.123 So cold I turned blue

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6.124 Speckle patterns

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6.125 Colors in fluorescent light

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.126 Polarizing sunglasses

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6.127 Sky polarization

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.physorg.com/news91798327.html Vikings use of polarized light to navigate when the Sun was not visible

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6.128 Ant navigation

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http://www.youtube.com/watch?v=w9KDM4C1kVg video about the navigation of the desert ant
www.theobio.uni-bonn.de/.../index_en.html includes simulations

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6.129 Colors and spots and polarization

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://atmospherical.blogspot.com Way cool blog site with lots of photos and descriptions. Go through the archived blogs by clicking on the button at the bottom of the page. The blog started in April 2006. Find the entry for April 5, 2007 for polarization colors photographed through an airplane window.

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6.130 Colorless foam and grounded powder

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.131 Glossy black felt, glossy varnish

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6.132 Colors of green glass and green velvet

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6.133 Peachy skin and apparent softness

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6.134 Twinkies and Vaseline parties

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.youtube.com/watch?v=lP406GnB7n4 Haircream

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6.135 The colors of meat

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6.136 A short beer

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6.138 Disappearing coin

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6.139 Sunglasses and smog

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6.140 Brightness of the ocean

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6.141 Blue ribbon on sea horizon

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6.142 Darkness falls with a bang

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6.143 Colorful contrail

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics

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6.144 Nacreous clouds

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://www.atoptics.co.uk/ Many photos and explanations of atmospheric optics
http://www.britastro.org/iandi/gavin04.htm Photo
http://epod.usra.edu/archive/epodviewer.php3?oid=167296 Photo, nacreous clouds above Antarctica
http://math.ucr.edu/home/baez/diary/nacreous.jpg Photo
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6.145 Twilight purple light

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6.146 Ripples in the sky

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6.147 Line across distant rain

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6.148 Bright nights

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6.149 Zodiacal light, gegenschein, and other nocturnal lights

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http://www.astro.virginia.edu/class/majewski/astr313/lectures/photometry/photometry_reduction.html
Scroll down to the zodiacal light material

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6.150 Reflections from sea horizon

This item is discussed in the book ***The Flying Circus of Physics, second edition***, by Jearl Walker, published by John Wiley & Sons, June 2006, ISBN 0-471-76273-3.

The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

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6.151 Using a solid metal ball to focus light

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The material here is located at www.flyingcircusofphysics.com and will be updated periodically.

http://micro.magnet.fsu.edu/primer/lightandcolor/images/diffractionfigure2.jpg Diffraction pattern of light passing a double-edged razor blade

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6.152 A fast spin in a curved mirror

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6.153 Color of cigarette smoke

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6.154 If you could see in the UV

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6.155 Diffracted alphabet

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6.156 A Game: Reflection

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