

## Unit II – Reproduction and Development (Updated 2013)

### (1) U2 – Mitosis

The following animation explores the stages of mitosis and the important events that accompany each stage.

<http://www.johnkyrk.com/mitosis.html>

<http://www.sumanasinc.com/webcontent/animations/content/mitosis.html>

<http://www.cellsalive.com/mitosis.htm>

<http://www.sci.sdsu.edu/multimedia/mitosis/>

[http://www.zerobio.com/demosongs/Mitosis\\_in\\_a\\_Winter\\_Wonderland.mp3](http://www.zerobio.com/demosongs/Mitosis_in_a_Winter_Wonderland.mp3)

cleavage furrow (animal cells) vs cell plate (plant cells)

<http://www.flickr.com/photos/blueridgekitties/4631393811/>

[http://kr021.k12.sd.us/mitosis\\_practice\\_test.htm](http://kr021.k12.sd.us/mitosis_practice_test.htm)

<http://mybiologyclass.net/Mitosis.html>

### (2) U2 - Mitosis in Onion Cells Lab

This on-line lab/quiz will give you practise in identifying cells in different stages of mitosis. Give it a try!

[http://www.biology.arizona.edu/Cell\\_Bio/activities/cell\\_cycle/cell\\_cycle.html](http://www.biology.arizona.edu/Cell_Bio/activities/cell_cycle/cell_cycle.html)

[http://district.bluegrass.kctcs.edu/rmccane0001/shared\\_files/bio137website/BIO137/137Lab2/Lab2MitosisSlides.html](http://district.bluegrass.kctcs.edu/rmccane0001/shared_files/bio137website/BIO137/137Lab2/Lab2MitosisSlides.html)

### (3) U2 - Cancerous Tumor (Spreading)

The following animation shows the growth of a cancerous tumor and how it spreads from one site to another in the body. Choose "angiogenesis".

<http://www.hhmi.org/biointeractive/cancer/animations.html>

### (4) U2 - Radiation Therapy

The first link is an overview of cancer treatments. The second link is a slide show showing the typical steps that a patient follows in preparation for external radiation therapy. The third is a specific example of external radiation treatment.

<http://health.india.com/diseases-conditions/how-radiation-therapy-and-other-cancer-treatments-work-video/>

<http://www.mayoclinic.com/health/radiation-therapy/CA00075/RETURNLINK=1&RETURNTOOBJID=10F5ADEE-E7FF-0DBD-1C4B0F1820F5CDEA&slide=1>

<http://www.cancercenter.com/video/treatments-technology/radiation-therapy/imrt/>

### (5) U2 - Cancer Explanation

The following animation shows how cancers develop from mutations in the DNA molecule.

<http://www.insidecancer.org/>

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000125&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000125&ptid=17)

(6) U2 - Internal Radiation (Seeds)

Examples of brachytherapy.

<http://www.cancercenter.com/video/treatments-technology/radiation-therapy/brachytherapy/>

<http://www.youtube.com/watch?v=uFfnkLCnaeU>

<http://www.orau.org/ptp/collection/brachytherapy/seeds.htm>

(7) U2 – Chemotherapy

These animations explain how chemotherapy is effective in the treatment of cancers.

<http://www.cancercenter.com/video/cancer-types/medanim/chemotherapy/>

<http://www.enile.co.uk/portfolio/cancer/lymph03.html>

(8) U2 – Meiosis

This animation illustrates the steps of Meiosis I (SEPERATION OF HOMOLOGOUS CHROMOSOMES) & Meiosis II (SEPERATION OF CHROMATIDS).

[http://highered.mcgraw-](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation_how_meiosis_works.html)

[hill.com/sites/0072495855/student\\_view0/chapter28/animation\\_how\\_meiosis\\_works.html](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation_how_meiosis_works.html)

<http://www.johnkyrk.com/meiosis.html>

<http://www.cellsalive.com/meiosis.htm>

<http://www.sumanasinc.com/webcontent/animations/content/meiosis.html>

[http://biologyinmotion.com/cell\\_division/](http://biologyinmotion.com/cell_division/) excellent

(9) U2 – Meiosis: Crossing Over (Prophase I)

This animation illustrates the process of CROSSING OVER which occurs during Prophae I of Meiosis I. This is a source of genetic variation during sexual reproduction.

<http://highered.mcgraw-hill.com/sites/dl/free/0072835125/126997/animation5.html>

[http://www.execulink.com/~ekimmel/crossing\\_over.htm](http://www.execulink.com/~ekimmel/crossing_over.htm)

[http://www.zerobio.com/crossing\\_over.htm](http://www.zerobio.com/crossing_over.htm)

(10) U2 – Meiosis: Independent Assortment (Metaphase I)

This animation illustrates INDEPENDENT ASSORTMENT which occurs in Metaphase I of Meiosis I. This is another source of variation during sexual reproduction.

<http://www.sumanasinc.com/webcontent/animations/content/independentassortment.html>

[http://www.youtube.com/watch?v=iCL6d0OwKt8&feature=rec-LGOUT-farside\\_rev-rn-3r-4-HM](http://www.youtube.com/watch?v=iCL6d0OwKt8&feature=rec-LGOUT-farside_rev-rn-3r-4-HM)

(11) U2 – Spermatogenesis

This animation illustrates the formation of mature sperm cells through the process of meiosis.

[http://highered.mcgraw-](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation_spermatogenesis_quiz_1.htm)

[hill.com/sites/0072495855/student\\_view0/chapter28/animation\\_spermatogenesis\\_quiz\\_1.htm](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter28/animation_spermatogenesis_quiz_1.htm)

[1](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000120&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000120&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000120&ptid=17)

(12) U2 – Oogenesis

This animation illustrates the formation of a mature egg (ovum) through the process of meiosis.

[http://wps.aw.com/bc\\_martini\\_eap\\_4/40/10469/2680298.cw/content/index.html](http://wps.aw.com/bc_martini_eap_4/40/10469/2680298.cw/content/index.html)

(13) U2 – Acrosome

This animation illustrates the release of enzymes from the acrosome (enzyme cap) that allow sperm to penetrate the outer coating of the egg.

<http://www.stanford.edu/group/Urchin/acrosome.htm>

<http://bcs.whfreeman.com/thelifewire/content/chp43/4301s.swf>

(14) U2 - Stem Cell Sources

The following animation illustrates the sources of stem cells. Note the different degrees of plasticity (ability to develop into other cells).

<http://learn.genetics.utah.edu/content/tech/stemcells/scintro/>

(15) U2 - Stem Cells - Cure for Disease

Explore this animation which explains how stem cells might be used as a cure for a variety of diseases.

<http://www.dnalc.org/stemcells.html>

<http://www.edheads.org/activities/stem1/swf/index.htm>

(16) U2 - Reproductive Cloning

Use this fun animation to clone a mouse. This is the same procedure that was used to clone Dolly (the first cloned mammal). Remember this type of cloning is used for the purpose of creating a cloned being.

<http://learn.genetics.utah.edu/content/tech/cloning/clickandclone/>

(17) U2 - Therapeutic Cloning

Explore this animation explaining how stem cells can be cultured and then used to develop into specialized cells that may be used to cure disease.

<http://nortonbooks.com/college/biology/animations/ch15a04.htm>

(18) U2 - Death of Dolly - Concerns About Reproductive Cloning

This CBC news story discusses the death of Dolly, the first cloned mammal. Concerns surrounding reproductive cloning are discussed.

<http://www.cbc.ca/archives/categories/science-technology/biotechnology/canada-enters-the-clone-age/dollys-death-raises-big-questions.html>

(19) U2 – Budding

This video shows budding in yeast (a method of asexual reproduction).

[http://www.youtube.com/watch?v=dcNEfUnEt\\_g](http://www.youtube.com/watch?v=dcNEfUnEt_g)

[http://www.youtube.com/watch?v=0\\_gxNa57WZ0](http://www.youtube.com/watch?v=0_gxNa57WZ0) (hydra)

(20) U2 - Binary Fission

This animation illustrates binary fission in bacteria (a method of asexual reproduction). Scroll down the page to view.

[http://www.classzone.com/books/hs/ca/sc/bio\\_07/animated\\_biology/bio\\_ch05\\_0149\\_ab\\_fission.html](http://www.classzone.com/books/hs/ca/sc/bio_07/animated_biology/bio_ch05_0149_ab_fission.html)

<http://www.youtube.com/watch?v=DY9DNWcqxI4&feature=related>

(21) U2 - Spore Production

This animation shows spore production in a mushroom (a method of asexual reproduction).  
Scroll down to view.

[http://www.botany.hawaii.edu/faculty/wong/BOT135/Lect05\\_b.htm](http://www.botany.hawaii.edu/faculty/wong/BOT135/Lect05_b.htm)

<http://www.flowers.vg/flowers/mushrooms-gills.htm>

(22) U2 – Fragmentation

This picture shows fragmentation in the flatworm (a method of asexual reproduction).

<http://www.rzuser.uni-heidelberg.de/~bu6/Introduction03.html>

<http://www.youtube.com/watch?v=f7cXeWxxfD4>

(23) U2 – Parthenogenesis

This picture illustrates the male drone honeybees that are produced by parthenogenesis (a method of asexual reproduction).

<http://www.1001bees.site40.net/virginbirth.html>

<http://news.bbc.co.uk/2/hi/science/nature/6681793.stm>

(24) U2 - Flower Anatomy: Sexual Reproduction

Begin by clicking continue twice. This animation reviews both male and female structures within a perfect flower.

<http://passel.unl.edu/pages/animation.php?a=flowerbreeding.swf>

(25) U2 – Angiosperms: Double Fertilization

This animation illustrates the double fertilization that is unique to angiosperms (flowering plants).

<http://www.sumanasinc.com/webcontent/animations/content/angiosperm.swf>

(26) U2 - Growth of Pollen Tube

<http://www.youtube.com/watch?v=mWUehwBLneo>

<http://www.iwf.de/iwf/do/mkat/details.aspx?Signatur=c+1807>

(27) U2 - Male and Female Reproductive Pathways

The following animations can be viewed from this site by making the following selections. Choose "Reproductive System" from the sort list. For Sperm pathway select "Sperm Production". For Egg pathway select "Egg Production".

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000121&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000121&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000045&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000045&ptid=17)

<http://www.stlukes-stl.com/health-content/animation/200000.htm>

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000094&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000094&ptid=17)

(28) U2 - Menstrual Cycle

This interactive animation illustrates the hormonal and physical changes that accompany the menstrual cycle. Select "Reproductive System" from the Sort Animation List and then "Menstrual Cycle - Interactive Tool".

<http://www.stlukes-stl.com/health-content/animation/200000.htm>  
[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000087&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000087&ptid=17)

(29) AIDS

This short video provides information on how HIV attacks the immune system and how the virus is spread.

<http://www.youtube.com/watch?v=hdgNnXLY8LU>  
<http://www.rkm.com.au/VIRUS/HIV/HIV-animation.html>  
<http://sites.sinauer.com/cooper5e/animation0405.html>  
[https://highered.mcgraw-hill.com/sites/0072495855/student\\_view0/chapter24/animation\\_hiv\\_replication.html](https://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter24/animation_hiv_replication.html)

(30) U2 - Chlamydia (Pelvic Inflammatory Disease)

This animation explores the bacterial infection that causes chlamydia. It also discusses PID (pelvic inflammatory disease) which may result from this bacterial infection. Click on 3D animation.

<http://www.youtube.com/watch?v=1Lw53jFuOfI>  
<http://www.med.nyu.edu/sti/contentb47a.html?cid=3&ccid=60&cccid=22>

(31) U2 – Hepatitis

This animation discusses hepatitis C virus and how this viral infection can destroy the liver.

<http://www.healthcentral.com/animation/408/33.html>

(32) U2 - Genital Herpes

This animation reviews the cause and symptoms of genital herpes.

<http://www.youtube.com/watch?v=tHRDRUhycJc>  
<http://www.mushealth.com/video/Default.aspx?videoId=10076&cId=32&type=rel>

(33) U2 – Syphyllis

This brief video review the cause and symptoms of the STI, syphyllis.

<http://www.livestrong.com/video/1778-syphilis-health-byte/>  
[http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh\\_publishing\\_group/documents/video/WTDV027423.swf](http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_publishing_group/documents/video/WTDV027423.swf)

(34) U2 – Gonorrhea

This video provides a brief explanation of the STI, gonorrhea.

<http://www.youtube.com/watch?v=yHzhtCJ6KtI>  
<http://stdhelp.org/videos/gonorrhea/>

(35) U2 – Endometriosis – These animations illustrate endometriosis which is one of several possible causes of female infertility.

<http://www.doctoroz.com/videos/endometriosis-animation>  
<http://www.medindia.net/animation/endometriosis.asp>  
<http://www.virtualcancercentre.com/diseases.asp?did=852>

(36) U2 – Low Sperm Count – This article explores some causes of low sperm count and abnormal sperm production.

<http://www.babyhopes.com/articles/causes-low-sperm-count.html>

(37) U2 – Artificial Insemination – This jpg illustrates the artificial insemination process.

<http://www.youtube.com/watch?v=qCdLiLLF0vw>

<http://www.ivf-infertility.com/images/iui.jpg>

<http://www.surgicalvideos.net/artificial-insemination.html>

(38) U2 – In Vitro Fertilization (IVF) – These videos explain the in vitro fertilization process.

<http://www.youtube.com/watch?v=GeigYib39Rs>

<http://www.sumanasinc.com/webcontent/animations/content/invitrofertilization.html>

<http://www.medindia.net/animation/IVF.asp>

(39) U2 – In Vitro Maturation (IVM) – This video discusses IVM and advantages over IVF.

[http://www.metacafe.com/watch/yt-aN-BhFJ-xK4/cbs\\_fertility\\_made\\_easier\\_for\\_some/](http://www.metacafe.com/watch/yt-aN-BhFJ-xK4/cbs_fertility_made_easier_for_some/)

[http://www.dailymotion.com/video/xxysrt\\_ivm-in-vitro-maturation\\_lifestyle#.UfBnbG2wXeQ](http://www.dailymotion.com/video/xxysrt_ivm-in-vitro-maturation_lifestyle#.UfBnbG2wXeQ)

(40) U2 – Surrogate Motherhood – This news video explores one story of surrogate motherhood.

<http://www.youtube.com/watch?v=jy5hzU-izL0&feature=related>

<http://en.wikipedia.org/wiki/Surrogacy>

(41) U2 – Cryopreservation – This site shows some of the equipment used in cryopreservation.

<http://www.advancedfertility.com/freezer.htm>

<http://www.dnatube.com/video/8519/Cryopreservation-Egg-Freezing-Oocyte>

(42) U2 - Birth Control Pills

This animation describes how birth control pills are effective contraception.

[http://www.pbs.org/wgbh/amex/pill/sfeature/sf\\_cycle.html](http://www.pbs.org/wgbh/amex/pill/sfeature/sf_cycle.html)

(43) U2 – Norplant – This illustration shows the Norplant system.

<http://l.yimg.com/a/i/he/wmimages/pdr/fgwh2108.gif>

(44) U2 – Depo-Provera

This video discusses Depo-Provera as an effective contraceptive.

[http://www.dailymotion.com/video/x3smw2\\_mommys-minute-birth-control-dmpa-sh\\_news](http://www.dailymotion.com/video/x3smw2_mommys-minute-birth-control-dmpa-sh_news)

(45) U2 – IUD

This animation discusses the IUD and IUS as effective contraception methods. Scroll down for the other birth control animations.

<http://www.muschealth.com/video/Default.aspx?videoId=10080&cId=8&type=rel>

<http://www.virtualmedicalcentre.com/devices.asp?sid=7&title=intrauterine-device-iud#c8pub>

<http://www.youtube.com/watch?v=FuPFbgSm0QQ>

(46) U2 – Tubal Ligation / Vasectomy

The first links are animations of tubal ligations and vasectomies. The third link, a medical video, shows one form of tubal ligation. Note this is an actual surgical video...not for the squeamish!

<http://www.youtube.com/watch?v=GxRJH2f--P0>

<http://hon.nucleusinc.com/generateexhibit.php?ID=70250&I=>

[http://www.operationalmedicine.org/ed2/Video/tubal\\_ligation\\_video.htm](http://www.operationalmedicine.org/ed2/Video/tubal_ligation_video.htm)

<http://www.publichealthgreybruce.on.ca/sexual/factsheets/TubalFS.html>

(47) U2 – Diaphragm

This video discusses the use of the diaphragm as a contraceptive option.

<http://www.youtube.com/watch?v=yGh1rBV-kU>

<http://www.youtube.com/watch?v=1-iOyZvd8qI>

[http://www.metacafe.com/watch/1163730/internal\\_birth\\_control\\_diaphragms\\_birth\\_control\\_4/](http://www.metacafe.com/watch/1163730/internal_birth_control_diaphragms_birth_control_4/)

(48) U2 – Condom

This animation shows the correct use of a condom as effective contraception.

<http://www.medindia.net/animation/howtousecondom.asp>

(49) U2 - Rhythm Method (Natural Methods)

The beginning of this video discusses natural methods of birth control including calendar method, monitoring of cervical mucus and temperature monitoring.

[http://www.yteach.com/page.php/resources/view\\_all?id=pill\\_hormone\\_plaster\\_intrauterine\\_device\\_IUD\\_uterus\\_menstrual\\_cycle\\_implantation\\_of\\_embryo\\_sperm\\_cell\\_Billings\\_ovulation\\_method\\_BOM\\_hormonal\\_contraceptives\\_menstrual\\_cycle\\_FSH\\_LH\\_ovarian\\_follicle\\_ovulation\\_oestrogen\\_progesterone\\_t&from=search](http://www.yteach.com/page.php/resources/view_all?id=pill_hormone_plaster_intrauterine_device_IUD_uterus_menstrual_cycle_implantation_of_embryo_sperm_cell_Billings_ovulation_method_BOM_hormonal_contraceptives_menstrual_cycle_FSH_LH_ovarian_follicle_ovulation_oestrogen_progesterone_t&from=search)

(50) U2 - Emergency Contraception

This video explores the use of emergency contraception.

<http://www.health.qld.gov.au/istaysafe/movies/emergency-pill.aspx>

(51) U2 – Development and Differentiation

This animation follows the zygote through the stages of development and differentiation: zygote, embryo, morula, blastocyst, gastrula, neurula and fetus.

<http://science.howstuffworks.com/environmental/life/human-biology/human-reproduction10.htm>

<http://www.colorado.edu/intphys/Class/IPHY3430-200/024reproduction.htm>

[http://d.violet.vn/uploads/resources/415/amniote\\_egg.swf](http://d.violet.vn/uploads/resources/415/amniote_egg.swf)

<http://stemcells.nih.gov/info/cellmovie.htm>

<http://www.med.nyu.edu/sti/contentf4db.html?cid=5&ccid=81&cccid=180>

(52) U2 – Twins

This animation explains how identical twins (monozygotic) and fraternal twins (dizygotic) form.

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000058&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000058&ptid=17)

(53) U2 – Ultrasound

This animation shows how an ultrasound works.

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000134&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000134&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000135&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000135&ptid=17)

(54) U2 – Amniocentesis

This animation shows how an amniocentesis is completed.

[http://www.muschealth.com/gs/MediaPlayer/sw\\_gui2\\_player.html?id=amno](http://www.muschealth.com/gs/MediaPlayer/sw_gui2_player.html?id=amno)

<http://www.embryology.ch/anglais/kchromaber/popupchromaber/video/amniozentese.html>

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000130&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000130&ptid=17)

(55) U2 – Fetoscopy

This is a picture of an endoscope. Also visit for some amazing pictures taken with an endoscope.

<http://upload.wikimedia.org/wikipedia/commons/8/87/Fetal-endoscope.gif>

<http://prolife.org.nz/resources/fetoscope-and-4d-videos/>

(56) U2 – Chorionic Villi Sampling (CVS)

This animation illustrates the procedure of chorionic villi sampling (CVS)

<http://www.youtube.com/watch?v=goEZ7feoZVk>

<http://www.embryology.ch/anglais/kchromaber/popupchromaber/video/chorionzotten.html>

(57) U2 - Teratogens (Cigarette Smoke)

This animation shows how nicotine can cross the placenta by diffusion and enter the fetal bloodstream.

<http://www.bioscope.com.au/taste/cd1/a0262.htm>

<http://whyquit.com/whyquit/LinksBirth.html>

(58) U2 - Teratogens (Alcohol)

This picture shows the physical difference between a normal human brain and a FAS brain.

<http://library.thinkquest.org/C0127302/ThinkFASpage4.htm>

(59) U2 – Teratogens (Thalidomide)

This animated film follows development and differentiation of a fetus and the effect of the teratogen thalidomide. You may need to type the link into your browser.

<http://www.youtube.com/watch?v=1G8EG0I7JZI>

(60) U2 – Teratogens (Prescription Medications)

This article shows the risk of certain medications during pregnancy. A safety category for medications is assigned by using a five-letter system.

<http://emedicine.medscape.com/article/260725-overview>

(61) U2 – Childbirth – These animations show the stages of childbirth (vaginal delivery).

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000108&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000108&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000138&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000138&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000100&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000100&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000076&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000076&ptid=17)

[http://www.pennmedicine.org/encyclopedia/em\\_DisplayAnimation.aspx?gcid=000079&ptid=17](http://www.pennmedicine.org/encyclopedia/em_DisplayAnimation.aspx?gcid=000079&ptid=17)