

Plant Cell Biology on DVD

Information for students and a resource for teachers

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The audience for this project consists of biology students, researchers and teachers, from advanced school teaching through undergraduate teaching to post-graduate course work. *The aim* is to provide a library of first-class images on disc, accompanied by supporting text information, dealing comprehensively with structure-function aspects of plant cell biology. *The material* is accessed by way of a versatile but friendly user interface, custom-made to facilitate (a) browsing by learners and (b) use as a resource by teachers.

Presentation is in the form of a stand-alone program developed using the Macromedia Director® software package. An installer loads the main program into the Windows start menu of the user's PC, also an Instruction Manual, a Guided Tour and an uninstaller.

Plant Cell Biology on DVD includes more than 2000 images in about 1500 screens - light and electron micrographs of many types, anaglyph stereos (a pair of red-green stereo glasses is provided), confocal animations, and static and animated diagrams. Many real-time or time-lapse digital movies of live cell phenomena complement the images of static material. They are a key part of the programme, for they give students and teachers views of phenomena in living cells which not one in a thousand could ever experience at first hand. Years of work have gone into their production. Together with confocal and other animations there are 270 of these quicktime movies, which require the Quicktime® player (free download from www.Apple.com).

Quality control: Photographic plates and computer screens are fundamentally different ways of presenting visual information. To ensure that the images are not degraded when displayed on screen (or by video projector in a lecture/tutorial situation), all have been provided in conformity with the Nyquist criterion, which specifies the minimum number of pixels for given levels of detail.

The user interface is a critical aspect of any screen presentation. In "Plant Cell Biology on DVD" comprehensive navigation facilities are available on every screen. The main Chapter menu leads to lists of "Topics" within chapters. Every Topic opens at a summary page, and controls for accessing screens within Topics are provided on all screens once the Topic is started. Topics can be studied systematically (progress monitoring is provided) or by browsing *via* the menus or a hypertext index of plant names. Every image has labels and scrollable captions. The DVD is not a textbook, but concise, referenced text essays (which can be printed) introduce many topics and are available at their opening Summary screens.

Subject headings:

Introduction: ~140 stills + 13 movies introducing cell types and surveying cell organelles

Nucleus: ~133 stills + 30 movies on chromatin, nuclear envelope, nucleolus, Cajal bodies

ER: ~80 stills + 12 movies/animations dealing with rough, smooth, cortical, and ER in mitosis

Golgi: 86 stills + 11 movies/animations on structure and functions, assembly and division

Plasma membrane: ~75 stills describing general features, surface amplifications & adhesions

Plasmodesmata: 63 images showing structure and transport properties

Vacuole: ~72 stills + 33 movies on dynamics, contents, categories, cell enlargement, tonoplast

Mitochondria: ~82 stills + 21 movies on structure, behaviour, fusion-fission, origin

Plastids: ~787 stills + 108 movies/animations covering proplastids, chloroplasts, etioplasts, amyloplasts, chromoplasts, leucoplasts, elaioplasts; a taxonomic survey of algal and higher plant groups, endosymbiotic origins, division processes, positioning in cells, thylakoid/granum

architecture, stroma components, rubisco, pyrenoids, starch, DNA, C4 variations, and a large section on the dynamic behaviour of stromules.

Peroxisomes: ~41 stills + 3 movies dealing with structure categories of function and proliferation

Cytoskeleton: ~386 stills + 64 movies/animations on actin and cytoplasmic streaming, microtubules, cortical arrays and wall deposition, pre-prophase bands, the mitotic spindle, phragmoplasts, initiation of microtubules and assembly of arrays, and specialized systems in spermatozooids, nucleo-cytoplasmic domains, quadripolar meiotic spindles and lipotubuloids

Vesicle Trafficking: ~126 stills + 3 movies on endo- and exo-cytosis, endosomes, pre-vacuolar compartments (MVBs), Golgi associated vesicles and TGN, clathrin coated vesicles

Organelle Interactions: ~24 stills and 6 movies illustrating positional interactions in the cell.

Much of the content has been newly prepared by the author, also experts in certain topics have generously provided key images.

Pre-recorded slide-shows: Teachers who have to prepare tutorial or lecture presentations need a "slide-show" facility, hence a built-in recorder which allows sequences of screens to be pre-selected for subsequent one-mouse-click display is included. Unlike Powerpoint® presentations, this facility is versatile enough to allow the presenter to digress from the preset slide-show by way of the menu system, and then to return seamlessly to the pre-recorded sequence. Presentation sequences are stored as text files on disc for easy re-use. Sample pre-recorded sequences are provided.

Three ways to use "Plant Cell Biology on DVD"

- (1) Individuals working at a PC;
- (2) Teachers showing images to a class by means of a projector connected to a PC – the viewing screen can be filled by setting the PCs display setting to 800x600 pixels, alternatively some projectors may provide a large enough image through a zoom control;
- (3) Classroom use:- holders of the "Classroom Licence" can instal the program on many PCs in a classroom, or it can be accessed from a central server by many terminals. In either case pre-recorded slide shows (see preceding paragraph) provide an effective way or preparing material for class use.

Web site

Sample images and the Instruction Manual may be viewed at www.plantcellbiologyonDVD.com