

## AV & Software Reviews

### CELL BIOLOGY TEACHING MANIPULATIVE

**VIRTmac Magnetic Manipulative Teaching System. Membrane/Protein Kit. 2007.** Part of the VIRTmac series created by John MacLellan. Visit [www.virtmac.com](http://www.virtmac.com) for ordering and pricing information.

#### System Requirements:

- Standard classroom blackboard
- DVD Player to access the kit lessons.
- Some assembly required (magnetizing models).

The VIRTmac **Membrane/Protein Kit** is part of the larger VIRTmac instructional system designed by using two-dimensional magnetic molecular models for use on a standard classroom blackboard. There are three instructional kits: **Membrane/Protein Kit** (Cell Structure, Cell Size, ETC Photosynthesis, ETC Respiration, Membrane Transport, and Nerve Impulse); **DNA/RNA Protein Kit** (DNA Replication, Protein Synthesis, Lac Operon, Mitosis, Meiosis); and **Protein Folding/Enzyme Structure Function Kit** (Structure Theory, Mechanisms of Interaction).

Using the DVD instructions contained in each kit, the teacher is clearly led through the process of preparing and using the models. These instructions include note-taking techniques for the students and pedagogical techniques for the teacher.

The **Membrane/Protein Kit** begins with students studying eukaryotic cell structure in considerable depth and detail. The magnetic manipulatives

allow the teacher to model the phospholipid bilayer, various membrane proteins, and cell organelles. The magnetic models can easily be moved on the blackboard allowing the teacher to demonstrate dynamic cell processes: i.e., movements of worker proteins, movement of substances through membrane protein channels, endocytosis, and exocytosis.

The second lesson helps students to understand the relationship between cell surface area- to-volume ratio. The dynamic aspect of the blackboard models allows the teacher to increase the membrane surface area and clearly show how the volume of the cytoplasm changes and cell needs change. Students are left with both a strong qualitative and quantitative understanding of this important concept.

Biochemical and molecular processes are, by their very nature, dynamic and complex and consequently can be quite challenging to teach. The third and fourth lessons in the kit, *Electron Transport Chains in Cellular Respiration* and *Photosynthesis*, are superb examples of effective instructional tools to help the teacher model and explain such concepts. The movement of electrons by carrier proteins, photolytic release of oxygen, hydrogen ions, and electrons are clear and easy for the instructor to show in photosynthesis. Likewise, the ETC in respiration allows the instructor to show the similar mitochondrial processes involving electron carrier proteins, NADH, FADH<sub>2</sub>, and the chemiosmotic processes in the membranes of the mitochondria. The *Nerve Impulse* and *Membrane Transport* lessons also utilize the same instructional approaches to convey the processes occurring.

Computer simulations and movies can help the student visualize these complex cellular events; however, the student can sometimes become a passive observer in the process. The VIRTmac system allows for many of the processes to be vividly shown while at the same time engaging the students in very creative note-taking techniques.

VIRTmac is an acronym for Virtual Interactive Revolutionary Tactile. The mac refers to the creator's last name (MacLellan) and not the Macintosh

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operating system. John MacLellan has created a wonderful set of instructional kits based upon the magnetic manipulatives he has developed and used in his own classroom in Ontario, Canada. These are an indispensable addition to any biology educator's toolkit for instruction.

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## BIOLOGY AND BIOETHICS OF STEM CELLS

**StemCellResources.org**. 2007. Accessed February 21, 2008. <http://www.stemcellresources.org/index.html>.

**StemCellResources.org** is presented as a service of the Biology Teachers Association of New Jersey, and lives up to the billing—this Web site is an unparalleled resource for teachers who wish to integrate stem cell education into their curriculum. It is designed to be a link between those who are immersed in stem cell issues—scientists, legislators, and bioethicists—and the life-science teachers who sculpt these issues for the next generation. As a science teacher, I was most impressed that the enormous range of resources and the fluid functionality of the Web site. Furthermore, the Web site is dynamic, morphing daily to reflect current events. The most tangible example of this phenomenon is the quote posted on the bottom of the each page, which changes daily to communicate a new statement from a prominent scientist, legislator, or ethicist.

The impressive breadth of the Web site is reflected in the menu options posted at the top of the homepage:

- General Resources
- Teaching Tools
- Who's Who
- Multi Media
- News & Journals
- Policy & Ethics
- Glossaries

General Resources provides links to over a dozen international sites on stem cell research, ranging from national institutes such as the Australian Stem Cell Centre and the National Institutes of

Health to prominent University and private institutions such as the Whitehead Institute for Biomedical Research.

The pages that were most impressive and practical for classroom teachers were the *Teaching Tools* and *Multi Media* pages. *Teaching Tools* contains the most comprehensive collection of curriculum resources on stem cells that I have encountered. The page includes a link to a complete curriculum; a set of 8 individual modules, each of which contains multiple classroom activities and Web links; a collection of over a dozen lesson plans; and a set of four distinct web quests; and links to national and state content standards. The practicality and efficiency of having such a myriad of teaching resources clearly labeled and organized into a single site is superb.

However, the *Multi Media* resources are simply beyond compare. The page is subdivided into six separate pages: *Animations*, *Podcasts*, *Webcasts & Videos*, *Powerpoints*, *Maps*, and *Timelines*. The *Animations* page provides links to eight different sites, many of which contain multiple animations and short videos regarding stem cell development and functionality. The superior quality of the animations was as equally impressive as the selection – the high quality graphics and concise nature of the animations provided by the Riken Center for Developmental Biology, for example, made them superb additions to the classroom for enhancing student's visualization and comprehension of stem cells in the human body. The *Podcasts* page combines the attributes of enormous variety and up-to-date postings, presenting almost two dozen podcasts from more than a dozen sources. The *Webcasts* and *Videos* page again is comprehensive, with detailed descriptions and age-appropriate designations posted beneath the one dozen selections. The same attention to detail is demonstrated on the *Powerpoints* page, where the eight links to slideshows are accompanied by abstracts and information pertaining to the number of slides. The *Maps* page contains three links to global maps, each pinpointing the location of global stem cell resources. For example, one map marks the location of major stem cell research centers around the globe, with each map designation providing a link to the Web site of that particular center. Another map intriguingly posts links for any branch of science that is intertwined with stem cell research, such as genomics, human evolution, and regenerative medicine. Finally, the *Timelines* page contains almost a

dozen separate links to unique timelines that document the chronological history of stem cell discovery and research.

Attention to current events and culture regarding stem cell research is addressed by the Who's Who, News & Journals, and Policy & Ethics pages. Who's Who subdivides pivotal people in stem cell science into three categories: Researchers, Policy Makers & Ethicists, and Advocates. The name and title of each individual or organization is accompanied by a link if further information is desired. This layout, which is consistent throughout the Web site, allows for quick and easy navigation while providing the viewer with the autonomy to further explore each topic if desired with a simple mouse click. The News & Journals page contains separate pages for current news articles regarding stem cells and links to almost twenty different journals containing recently published articles on stem cells. As is consistent with the format of the website, I found the differentiation of media news content from journal articles to be incredibly useful for a classroom teacher. Introductory level students can easily navigate through the news articles, while advanced research students would be better served utilizing the journal articles. Finally, the Policy & Ethics page categorizes links to multiple resources for ethics, legislation, and public policy. This user-friendly Web site culminates in a series of glossaries that allow users to navigate through the complex vocabulary associated with stem cell research.

The enormous depth of material regarding the topic of stem cells on this site is truly remarkable. The content is available in multiple options of every type of media that is engaging in the classroom, and is organized into such a myriad of formats that all classroom teachers could find something on the site that aids them in their particular style of presentation. Perhaps most impressive is that this wealth of information is superbly organized on the site, and therefore the content is easy to navigate and can be accessed efficiently and quickly. Any teacher who addresses stem cell issues in the classroom would benefit significantly from the use of this website. The Biology Teachers Association of New Jersey has provided all Biology teachers with a tremendous resource.

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