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Focus on microscopy

MULTIMEDIA MICROSCOPY

By Barbara Foster and David Hillman

JURASSIC PARK. The name brings to mind the sound and fury of the Cretaceous era, but the early scenes of the movie also give a glimpse into the new age of multimedia imaging. On the park tour, children and adults alike marvel at the dashboard-mounted, touch-screen computers. With the gentle tap of a finger, they can conjure moving and sound-filled images of different dinosaurs, look up definitions, or get explanations. As seen in *Figure 1*, the same technology is now available in the microscopy laboratory.

Multimedia communications, a valuable new tool, seamlessly combines moving and still images, graphics, text, sound, and animation. For researchers, the tool expands the opportunity for archiving and annotating superb-quality images, then easily integrates them into presentations and articles. For educators, multimedia communications introduces a new concept of the laboratory and library by providing numerous, connected pathways to glossaries, image archives, and taped lectures. Imagine a laboratory practicum conducted in a classroom filled with terminals, eliminating the possibility for a student to accidentally bump into a microscope, defocus an image, or move the pointer to another feature. This sort of library/laboratory provides more individualized information, is open 24 hours a day, and, via networking and modem, can even be available to the student in his/her dormitory room.

For professional trainers, the multimedia approach has demonstrated a dramatic increase in the retention of new information as well as a reduction in training time. These systems readily accommodate the new global community. Programs can be generated with the same script in different languages and, at the touch of the appropriate country's flag at the beginning of the program, open the commentary in Spanish, English, German, Japanese, or any other programmed language.

Tools for getting started

Multimedia communications relies on a combination of imaging system (microscope and detector), software, and hardware. Media Organizer (Lenel Systems International, Inc., for Microsoft™ Windows®, Redmond, WA) is one example of multimedia integrating software. It accepts data from scanned photographs, negatives, or slides; graphic files from paint or scanning programs; 2-D and 3-D animation files; and audio files. A Windows-based user interface imports images directly or works with a standard frame grabber to capture images, then processes them to clarify and highlight key features. The software accepts both digital and analogue formats. This flexibility enables the easy importing of digital images stored on the computer hard drive or CD-ROM, as well as analogue videotape recorders or videodisk for noiseless still frames and full motion video.

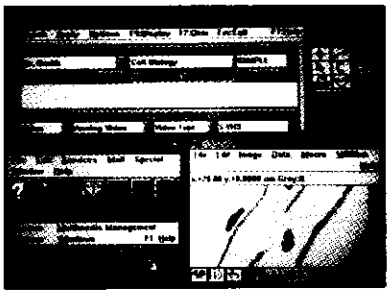

Figure 1 *An example of a Media Organizer screen showing image analysis results from Bioscan Optimas (Washington, DC) and a general information programming package.*

Document and text files from word processing programs or image analysis programs supply the verbal context and numerical data and audio files provide sound. Hardware options are equally flexible. Systems can be built around 386 or 486 PCs or an Apple Macintosh Quadra (Cupertino, CA). Any of these systems provides the multiple inputs for data and image acquisition.

To complete the process, final reports and presentations are sent to 600 dot/in. laser printers for hard copy, or film recorders for easily transported videos. New, interactive CD players provide the minitheaters for viewing.

Dream or reality?

Histologist A.W. Gustafson of Tufts University School of Medicine (Boston, MA) is a strong multimedia proponent. He heads Tufts' new Imaging Center, which opened on July 1, 1993. Using a Macintosh Quadra 950, Dr. Gustafson has been

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building an image archive with photographic quality 24-bit true color (16 million colors), storing images directly from his microscope to 650-Mbyte magneto-optical drives in digital form.

Part of his charter at the Imaging Center is the creation of a digital microscopy library from images and text contributed by properly cited "image authors." Annotated with patient data on sex, age, and condition, but devoid of confidential personal information, these images will be available to students, researchers, and educators. For example, the touch of a computer key can deliver images and data on the number of women over the age of 50 with osteoporosis. Microscopy images can be easily integrated with data from other technologies such as radiology and MRI.

In the laboratory, access to multimedia programming overcomes the frustration of students who cannot get the instructor's ear in a class of 25. The computer's zoom capability duplicates the microscope on the desktop, providing both the context of lower magnification and the increased detail of higher magnification. Dr. Gustafson will also be adding microscopy images to other key applications already in place, including ADAM (Animated Dissection of Anatomy for Medicine, ADAM Software, Inc., Marietta, GA) in the human gross anatomy courses, and a university-to-industry training program in anatomy and physiology for salespeople from Astra Pharmaceutical Products, Inc. (Westborough, MA). Astra's program is also being evaluated by a major New England medical school for training surgeons.

Conclusion

With the mushrooming of new microscopy instrumentation and the related training requirements, the high cost of equipping multiuser/multifunctional laboratories, and the need to integrate microscopy images with other technologies such as MRI and radiology, the increased savings of time and increased effectiveness of new multimedia communications packages will be a welcome addition to the microscopy laboratory.