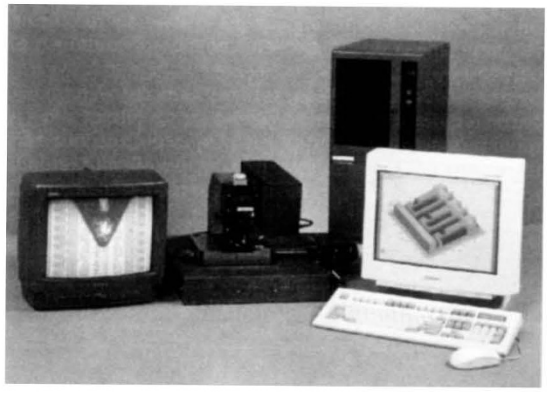
Sighting the molecules of life

Marketplace is regularly occurring section in *Nature Structural Biology* that highlights a selection of new and useful products of direct use to the broad sweep of scientists who are interested in structural biology. We also welcome suggestions for future features.

While X-ray crystallography and nuclear magnetic resonance spectroscopy allow researchers to probe the structure of biological macromolecules at atomic resolution not all structural biology is necessarily carried out at such high resolution. Indeed, many supramolecular assemblies or processes, because of their intrinsically heterogeneous, non-stoichiometric nature, cannot presently be analysed by X-ray crystallographic or NMR techniques. It is here that the different forms high-resolution microscopy can provide valuable insight into both structure, mechanism and function (see, for example the paper from McPherson and colleagues in this issue of *Nature Structural Biology*[1]).

Scanning electron microscopy (SEM) is a well-established methodology that continues to play an important research role in a wide range of scientific disciplines, including those that deal with the higher-order structure (and function) of biomolecules. Two new SEMs, one from Topcon Technologies Inc. (the SM-510 SEM) and one from Hitachi Scientific Instruments (the S-3200N VP-SEM) provide a range of features that the manufactures hope will make the instruments more readily available to all walks of scientists, and not necessarily just the technical elite.



Above: Park Scientific Instrument's new AutoProbe® M5 SPM.

The Topcon SM-510 offers a choice of the traditional automated features—such as autofocus, autogun alignment and autoastigmatism correction—and/or computer control of the microscope though a Windows®-based, mouse-driven interface. Digital image control and processing provide such features as flexible frame averaging, image storage at 512, 1024 and 2048 pixel resolution, and TIFF image-file formats for easy handling of digital images. The WET-SEM option allows analysis of non-conducting samples in their nature state with little or no preparation—even specimens containing water or oil.

The S-3200N VP-SEM from Hitachi Scientific Instruments also provides mouse-controlled operation and a graphical menu with, as well as extensive automation, features such as the computer-coordinated vacuum system which permits the transition from atmospheric pressure to low vacuum—allowing wet, oily, porous and otherwise problematic samples to be observed in their natural states. Similarly, a new cooling stage enhances observation of wet specimens by suppressing water vaporization. Both the SM-510 and the S-3200N offer very bright tungsten emitter sources which, Hitachi says of their instrument, results in the highest resolution possible.

Another, much newer form of microscopy is atomic force microscopy (AFM). Indeed, the technology is so young that methodology and applications—as well as the hardware—are still being developed. Park Scientific Instruments now announce the introduction of their new Autoprobe® M5 complete scanning probe microscopy (SPM) system. The microscope can handle samples both small and large (up to 16×16×1 inches) with a similar wide range in magnification—from 2 x 10^3 to 1 x 10^7 times with sub-angstrom resolution. And, the manufacturers tell us, the versatility doesn't stop there; the AutoProbe® does not require vacuum compatibility samples or special sample coatings—the microscopy can handle soft polymers, biological preparations and semi-conductor materials. Precise dimensional measurements can be made using the same company's ScanMaster® which provides closed loop calibration hardware for scan control.

BioRad's new GelDoc 1000.

Digital storage and control of valuable data is also an important feature of BioRad's new GelDoc 1000 System. The system provides a rapid means for imaging and quantifying ethidium bromide and other fluorescently strained gels without the need for darkroom or film. The images can be digitally manipulated by computer (both Macintosh® and Windows®-based PCs) and stored as publication quality, 8-bit TIFF files, as well as printed on any Macintosh® or Windows® compatible printer. In combination with BioRad's Molecular Analysis™ software the system can be used to make lane-to-land or band-to-band molecular weight comparisons as well as relative and absolute quantitation of samples.

1. Malkin, A.J. *et al. Nature struct. Biol.* **2**, 956-960 (1995).

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