MAGAZINE

Lab Manager™

Where Science and Management Meet™

April • May 2006 Volume 1 • Number 1

INSIDE:

THE COMPLETE LIMS FOR ENTERPRISING LABS

Based on 20 years of exclusive focus on laboratory information management systems, STARLIMS Corp. presents an entirely Web-based LIMS that works equally well in Intranet and Extranet environments. STARLIMS V10 enables you to structure all lab data and processes, delivering real-time actionable knowledge throughout your organization. Whatever your regulatory, enterprise or lab requirements, here are the first 10 reasons to evaluate STARLIMS V10:

1. **Entirely Web-based using programmable XML and .NET**
2. **Enterprise-wide interoperability, based on an integrated Web Service platform**
3. **Instant global deployment with zero client-side installation**
4. **Fully scalable, from a single site to the entire enterprise**
5. **Enthusiastic user acceptance, thanks to a "rich" true-to-life GUI**
6. **Intuitive configuration of complex structured and unstructured lab processes**
7. **Future-proof, with multi-tiered architecture safeguarding business logic**
8. **User-defined key performance indicators (KPI) presented in easy-to-read gauges**
9. **Multilingual solution backed by expert worldwide support**
10. **Based on 20 years of LIMS-only development**

To evaluate STARLIMS V10's capabilities in your industry contact us at 1-954-964-8663 or sales@starlims.com

www.starlims.com

Offices: Argentina, Belgium, Bulgaria, Canada, China, Colombia, France, Hong Kong, Indonesia, Ireland, India, Israel, Japan, Kuwait, Malaysia, Mexico, Netherlands, Norway, Peru, Portugal, Puerto Rico, Qatar, Romania, South Africa, Spain, Sweden, Thailand, Turkey, UAE, UK, USA, Venezuela.

STARLIMS

LAB DATA / ENTERPRISE ACTION

Guaranteed cleaning within your reach

Miele's advanced undercounter glassware washers put analytically clean glassware within your reach. With Miele, pre-soaking and hand-scrubbing are a thing of the past. High-quality Miele glassware washers save you valuable time, and provide outstanding repeatable cleaning results time and time again.

We are so confident that our washers will satisfy your cleaning requirements that we guarantee it. If you're not satisfied with the cleaning performance of our washer, we will let you return it… for a full refund. Contact us for more information.

Miele has been perfecting the science of cleaning for over 100 years. Our wash programs incorporate the ideal balance of time, temperature, spray action, and rinsing with pure water so that you can concentrate on what you do best. Research.

For guaranteed cleaning within your reach, contact Miele.

Miele PROFESSIONAL

Ask us about the exclusive Miele Cleaning Guarantee

Specialized inserts for specific cleaning applications

Intuitive, flexible, and secure controls

Injection cleaning of narrow-neck glassware

Miele Professional

✆ (800) 991-9380

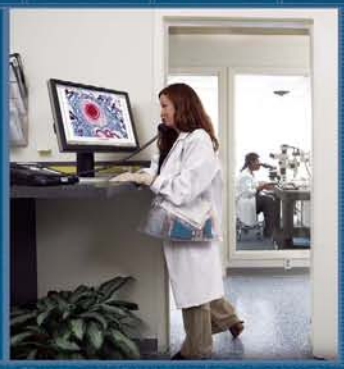
labwashers.com

Lab Manager MAGAZINE
Where Science and Management Meet™

contents
APRIL MAY 2006

features

departments



IT LIKES TO BE THE CENTER OF ATTENTION.

**FOCUS THE SCOPE. START BROADCASTING.
THEN LET EVERYBODY ELSE JOIN IN.**

MicroSuite imaging software with **NetCam,** combined with a **BX41 microscope** and **DP70 digital camera,** turns your pathology lab into a real-time educational or consultative webcast. Now everyone can be on the same page, whether it's across the hospital or across the country. Another innovation...from Olympus.

olympusamerica.com/microscopes 800.446.5967

OLYMPUS®

Your Vision, Our Future

Lab Manager MAGAZINE

Lab Manager Magazine™ is published five times a year by Vicon Publishing, Inc., 4 Limbo Lane, Amherst, NH 03031. Postage paid at Fulton, MO 65251. Permit #38. A requester publication, *Lab Manager™* is distributed to qualified subscribers. Non-qualified subscription rates in the U.S and Canada: $120 per year. All other countries: $180 per year, payable in U.S. funds. Back issues may be purchased at a cost of $15 each in the U.S. and $20 elsewhere. While every attempt is made to ensure the accuracy of the information contained herein, the publisher and its employees cannot accept responsibility for the correctness of information supplied, advertisements or opinions expressed. POSTMASTER: Send address changes to Vicon Publishing, Inc., 4 Limbo Lane, Amherst, NH 03031.

WDS Canadian return: Station A P.O. Box 54 Windsor, Ontario N94 6J5

EXECUTIVE OFFICES

Vicon Publishing, Inc. • 4 Limbo Lane • Amherst, NH 03031
603-672-9997 • fax 603-672-3028 • www.viconpublishing.com

See it **work** for you at the PerkinElmer PITTCON® Booth

At PerkinElmer we understand that your best work happens when your lab performs at peak capacity, efficiency and accuracy. Our products and knowledgeable support can empower your smart thinking.

- **Smarter FT-IR sampling**—Spectrum™ 100 FT-IR Series with "GO button"
- **Unique sample re-collection and tube/trap impedance testing**—TurboMatrix™ 650 ATD Thermal Desorber
- **A new level of LIMS tailoring**—LABWORKS™ LIMS v5.9 with new *Blueprint Technology*
- **Big performance in a small package**—better thermal analysis DSC for QA/QC and educational labs
- **Increased lab productivity and reduced maintenance costs**—OneSource® Maintenance & Asset Management Solutions, a single-point-of-contact for your institution

Visit Booth #2669 to see how our technologies and services can empower you. While you're there, register to win a Dell Axim™ with GPS and 3-D game bundle. **Now that's smart thinking!**

For more details visit www.perkinelmer.com/pittcon06/lm

PerkinElmer®
precisely.

(800) 762-4000 (U.S. and Canada)
(+1) 203-925-4602
For a complete listing of our global offices, visit www.perkinelmer.com/lasoffices

www.perkinelmer.com

The War on Armchair Management

George Patton was quoted as saying, "No good decision was ever made in a swivel chair." Over the years, I have come to agree with him. In one of my first jobs at a large clinic in Boston, there seemed to be daily edicts from "the top." These invisible leaders worked in large offices with expensive desks, and seemingly had nothing better to do than spin around in their sumptuous leather chairs and dream up new things for the lower echelons to do. We received regular notices (tacked onto a bulletin board) about changes or improvements or restructuring that always meant we had to change or improve or restructure. No one asked for our input. No one offered an explanation why and no one in my office was particularly happy with their job. There was constant grumbling, frequent attempts at undermining the new rules, and very high employee turnover. The clinic management was a faceless bunch that rarely set foot in our area of the building. If they did, they were escorted through quickly by the head of our department who made sure that there was little or no interaction with any of "us." And it was very clearly an "us" and "them" situation - on both sides. They were a them to us and we were a them to them. And the relationship made as much sense as the sentence I just used to describe it.

Someone recently said that I should be glad to have experienced working under poor management. I must have learned a lot about what not to do. I hope I have. No worthwhile employee wants to be disconnected from the process of improving their work environment. No worthwhile manager makes changes without gaining support, or at best, awareness of what employees think. Change, even unpopular change, is best served with communication and willingness to invite discussion.

Management has been called an art and a science. *Lab Manager Magazine* agrees. In fact, our goal is to help bring the art of management into the science setting. Our focus is on the role of the scientist who is also a manager. We will offer articles pertaining to managing all aspects of laboratory operation in all types of labs. The job of manager, no matter the setting, requires the knowledge to establish goals, get a grip on the budget, hire, fire, develop efficient work flow, improve quality - to name only a few. There's no one way to do anything and *Lab Manager Magazine* aims to offer a wide variety of choices and information to help you hone your management style and to develop strong and sustainable management practices.

In the words of Peter F. Drucker, renowned management consultant, "Management means, in the last analysis, the substitution of thought for brawn and muscle, of knowledge for folkways and superstition, and of cooperation for force. It means the substitution of responsibility for obedience to rank, and of authority of performance for the authority of rank."

Subscribe to *Lab Manager Magazine* today for information and insights into improving management skills in a scientific setting. Then get out of your swivel chair and walk into your lab to put what you've learned to work.

Patrice Galvin

Sartorius' precise and reliable calibration weights.

Designed to meet or exceed all ASTM standards, Sartorius offers a complete line of certified calibration weights, in sizes ranging from 1mg to 5 kg. Each weight features single-piece aluminum or stainless steel construction and contains no air cavity or foreign adjusting material for maximum mass stability. Available as pre-configured or custom-designed sets, Sartorius calibration weights come in flat-style (1mg to 500mg) and knob-style (1g to 100g).

Moisture analysis without the wait.

The MA35 is the newest addition to the Sartorius family of moisture analyzers. With a rugged metal heating element and accurate monolithic weigh cell, the MA35 is a high quality moisture analyzer at a very affordable price.

Small samples, big precision.

Sartorius has set the standard in high precision weighing with the SE2 and ME5 ultra-micro and microbalances. The new LE26P microbalance continues that tradition with its 2/10ug readability and 5/21g capacity, while being one of the most affordable microbalances on the market today.

sartorius

Practical Solutions to Everyday Weighing Series: #1 General Weighing

#1	General Weighing
#2	Sartorius Service
#3	Moisture Analysis
#4	SQmin for USP <41>
#5	Filter Weighing
#6	Static Elimination
#7	Mass Metrology
#8	Education

Copies of the complete Solution Series are available on our Sartorius North American website @ www.SartoNews.com

Practical Solutions for Everyday Weighing Needs.

Cutting-edge technology at a competitive price

The New Sartorius Extend Series laboratory balances offer advanced technology you don't pay extra for.

The Extend Series features a new and powerful processor and monolithic weighing system for fast and accurate results usually reserved for higher priced balances. All models are available with or without the internal calibration option. In addition, a high quality backlit display and advanced application programs make the Extend Series of balances a full featured balance for a highly attractive price.

And we'll help you see for yourself with our FREE 30-day Demo Challenge.

So, take advantage of our demo offer, contact us today at **1-800-635-2906, ext. 8272** or visit **www.SartoNews.com**

30 day *demo challenge*

DocuMeter helps close the reliability gap in pH measurement.

The innovative DocuMeter system sets new, higher standards of reliability for documentation of measured results in electrochemical analysis. Calibration data from electrodes is available at the touch of a button for full traceability of pH measurements. Enjoy the benefits of automatic calibration and uniquely identified and quality controlled electrodes.

Get X-Static.

When it comes to eliminating harmful static electricity from your weighing processes, Sartorius can help you ensure your samples are analyzed with absolute precision. From its line of ME Series balances – which exclusively feature the "N.I.C.E." static elimination system – to the compact, portable power of its Stat-Pen and Ionizer Blower units, Sartorius takes a dynamic approach to eliminating static electricity.

Editorial Advisory Board

Lab Manager Magazine is proud to have an Editorial Advisory Board that spans many disciplines of science with a broad array of expertise. Members of the board have been selected for their technical and industry knowledge, and for their willingness to provide insight and guidance. They are:

Dr. Michael Brownstein earned his A.B. from Columbia College and his M.D. and Ph.D. degrees at the University of Chicago. He joined the NIH in 1972. During his career there, Dr. Brownstein's research included developing more sensitive techniques for measuring neurotransmitters and their biosynthetic enzymes; mapping many "classical" transmitters and neuropeptides in the central nervous system; using pulse-chase studies in vivo to show that vasopressin and oxytocin are synthesized as parts of larger precursor proteins; and developing robust protocols for making cDNA libraries and expressing the inserts in mammalian cells. In the NHGRI, he was among the first people there to do high-throughput, fluorescence-based genotyping, and he developed a method for modifying the primers used to study microsatellite markers. In his final years at the NIH, Dr. Brownstein's focus was complex traits genetics and genomics. Dr. Brownstein functioned as a Laboratory Chief, and as the acting Scientific Director of the NIMH's Intramural Research Program. He has served on numerous editorial boards, scientific advisory boards, and review committees, and has received a number of awards, most recently, an honorary Doctorate from the University of Lund in Sweden. In 2005 he left the NIH to accept a position as head of functional genomics at the J. Craig Venter Institute, Rockville, MD.

Lyn Faas currently works as a consultant specializing in laboratory management. Previously, she worked for Seattle Public Utilities where she served as a Strategic Advisor for the Customer Service Branch and was the Regulatory Compliance Manager overseeing the city's drinking water laboratory. Prior to joining SPU in 1999, she worked for King County for 14 years as the Director of their Environmental Laboratory. Lyn began her laboratory career with the EPA in 1975, where she conducted pesticide research and served as project manager for a priority pollutant study. She has been involved in laboratory management since 1981, including positions with Environmental Research Group and the Alaska Department of Environmental Conservation. In her career as a laboratory manager, Lyn focused on employee involvement, continuous quality improvement, benchmarking, employee development, and customer service. She has been an active member of ALMA since 1995, and she served as the treasurer of ALMA for several years before becoming the president in 2005. Lyn holds a B.S. degree in Chemistry and a M.S. degree in Materials Engineering, both from Purdue University, and she completed the University of Washington Management Program in 1990.

Wayne Collins is the Professional Services Product Manager for Thermo Electron Corporation where he is responsible for developing their laboratory productivity services. Prior to Thermo Electron, he was the Analytical and Quality Services Manager with BP Solvay Polyethylene North America for over 20 years. He holds a Ph.D. in analytical and inorganic chemistry from the University of Houston and an MBA from Wright State University. Dr. Collins is an active member of many professional organizations, including the Board of Directors of the Analytical Laboratory Managers Association (ALMA) as well as past-President. He is also editor of Managing the Modern Laboratory, a peer

Get in touch with the power

Visit us at Pittcon
Booth #3155

find out what's inside

BRUKER ADVANCED X-RAY SOLUTIONS

BRUKER axs

www.bruker-axs.com • info@bruker-axs.com

reviewed professional journal devoted to laboratory management issues published by ISC. In addition to the print journal, he is editor, writer, and publisher of the quarterly ALMA e-News (worldwide) and has presented laboratory management workshops in the U.S. and Europe. He is a member of the Advisory Board for Chemical Technology Program for Texas State Technical College, Marshall, TX; member of Partners Subcommittee of the National Committee on Chemical Safety of the American Chemical Society; member of Society of Industry Leaders ; and a member of American Chemical Society.

Glenn Ketcham is a Certified Industrial Hygienist with 22 years experience in the health and safety field. He is currently the Risk Manager for the University of Florida with responsibility for the loss prevention, ergonomics, disaster preparedness and the occupational medicine surveillance programs. He has managed the laboratory safety programs for both the University of California, San Diego (UCSD) and the University of Florida. In addition, he served as an industrial hygienist with federal OSHA compliance and has a Masters Degree in environmental engineering sciences with a health physics concentration.

industry knowledge, and willingness to provide insight.

Mary Keville initially trained as a Medical Technologist specializing in Clinical Microbiology and has since spent over 30 years managing laboratories. Her experience spans from bench supervisor and manager in hospital laboratories with staff from 6-26 to managing a diagnostic reference laboratory and then QC Laboratories in FDA-regulated diagnostics and biopharmaceutical companies. She has also held positions with responsibility for Regulatory Affairs in the diagnostics and blood products industries. Currently she is the Senior Director responsible for Quality Assurance and Quality Control at Massachusetts Biologic Laboratories (MBL) where she oversees a staff of 90 performing the functions of quality control, lot release, compliance, and GMP documentation. MBL is a manufacturer of plasma derivatives, vaccines, and monoclonal antibodies with two manufacturing plants in the Boston area. Ms. Keville has a B.S. from Northeastern University and an M.P.H. from Boston University.

Vince McLeod is a Certified Industrial Hygienist and the senior IH with the University of Florida's Environmental Health and Safety Division. He has 17 years of occupational health and safety experience in academic research with focus in the research laboratory. His specialties are in hazard evaluation and exposure assessments.

John L. Tonkinson, Ph.D., is currently the Director of Business Development at Epitome Biosystems in Waltham, MA, where he is responsible for developing and implementing a multi-tiered business strategy in the Measurement Proteomics area. Dr. Tonkinson joined Epitome from Schleicher & Schuell BioScience where he held positions in R&D as well as in sales and marketing. At S&S, Dr. Tonkinson led teams that developed several products for lateral flow immunodiagnostics. Prior to joining S&S, Dr. Tonkinson worked in the biopharmaceutical industry as a Research Scientist at Hybridon, Inc. where he led a group developing genetically based anti-cancer drugs and as a Post-Doctoral Scientist in the Cancer Research Division at Eli Lilly and Co. Dr. Tonkinson is on the Reader Advisory Board for IVD Technology, has served as an ad-hoc reviewer for multiple journals, and has published more than 25 peer-reviewed research articles, review articles, and book chapters. He has also served on the Board of Directors for the New Hampshire Biotechnology Council. He earned his Bachelor's degree in Biochemistry from the Philadelphia College of Pharmacy and Science and his Ph.D. in Biochemistry and Molecular Biophysics from Columbia University.

Andy Zaayenga has been involved in laboratory automation and robotics since 1989, first as an engineer at Zymark (now Caliper Life Science); then as founder of SmarterLab; then as founder of TekCel. Andy is Executive Chair and Webmaster of the nonprofit Laboratory Robotics Interest Group. Since his involvement in April 1996, the group has grown from a regional membership of 200 to a global presence of over 9,000. He is a past Board Director of the Association for Laboratory Automation (ALA) and holds memberships in the Society for Biomolecular Screening (SBS), Mensa, International Society for Biological and Environmental Repositories (ISBER), and the Institute of Electrical and Electronics Engineers (IEEE). He serves on the Program Committee of the Microplate Technology and International Conference on Automation and Robotics (MipTec-ICAR). He is an editor of the Dmoz Open Directory Project for the categories of Laboratory Automation and Robotics; Laboratory Refrigeration and Cold Storage; Laboratory Hoods; and Pipettors, Automatic and Manual. Andy has served as an Officer of the American Chemical Society Laboratory Automation National Division. Andy holds three patents and has published as well as collaborated and assisted with several scientific papers.

The Perfect Fit

Thermo Electron's innovative GC and MS technologies deliver superior performance, reliability, and value.

Visit our website at www.thermo.com/gc
or contact us for more information.
Tel: +1 800-532-4752 • Email: analyze@thermo.com

Look closer for answers

TRACE GC Ultra™

Analyze • Detect • Measure • Control™

Thermo
ELECTRON CORPORATION


100
ml
90
80
70
60
50
40
30

LABORATORIES in the age of systems biology

In the mid-1970s, the biological and biomedical sciences experienced tremendous growth in the development and application of relatively expensive and sophisticated instrumentation deemed critical for the execution of science in those fields. Some of the instruments to which I refer include amino acid analyzers, peptide synthesizers, spectrometers, and protein sequencers. In addition to the high cost for the purchase of these types of instruments, there were significant costs associated with their operation and maintenance. Further, this was accompanied by the need for a significant degree of technical expertise to operate these instruments at optimal levels. It became clear to both external and internal funding sources that the existing paradigm of purchasing an expensive instrument with significant capacity for throughput and placing it in an individual's laboratory was not an effective use of either funds or the instrument. Generally, the data required by any one individual was usually very specific and limited in the number of experiments that needed to be performed. Thus, it was not in the interest of the research faculty to master the technology, given the time and difficulty such a process demands. As a result, there began the development of "shared resources," "cores," or "facilities" whose function was the operation of these instruments, typically for a select group of scientists, with the aim of generating a maximal amount of data from the instruments for this group.

These instruments, in addition to providing an analytical and reagent support for targeted scientific fields, were also comparatively high-throughput platforms that solidified the concept of "shared resources"....

By the late 1970s and early 1980s, another wave of instrumentation development significantly influenced the biological and biomedical sciences; these instruments included the solid phase and gas-phase protein sequencers, DNA/oligonucleotide synthesizers, and DNA sequencers. These instruments, in addition to providing analytical and reagent support for targeted scientific fields, were also comparatively high-throughput platforms that solidified the concept of "shared resources" to broaden the cost-basis for operation by utilizing maximal throughput. Over the past two decades, there have been a variety of enhancements to those technologies as well as new technologies and platforms, such as instrumentation for gene expression profiling via DNA/oligonucleotide microarrays, proteomics utilizing mass spectrometry, and numerous front-end sample preparation technologies (e.g., 2D SDS-PAGE, orthogonal chromatographies), protein array technologies, single nucleotide polymorphisms (SNP) analysis and real-time quantitative PCR, just to name a few. All of these technologies were well suited for exploitation under the shared resource paradigm (i.e., high initial cost, high operational cost, high throughput, sophisticated operational expertise required) and further solidified the concept of institutional shared resources or cores in academic and industrial research settings.

The staffing of shared resource facilities in academic settings was generally by non-tenure

Jay W. Fox, Ph.D.

track research faculty or research associates who were rarely directly involved with the research process other than to perform their specific tasks. Over time, given the ever-increasing technological sophistication required for the effective operation of instrumentation, researchers were less able to critically understand the technology, and thus, became more and more reliant on the expertise of the shared resource staff. Interestingly, there seemed to be some reluctance of researchers to effectively "partner" with shared resources and their staff. An analogy of the process is of a sample anonymously pushed through a window in the wall and anonymously the resultant data returned to the investigator without significant interaction between the two parties. Furthermore, there was often little exchange between shared resource facilities within an institution and they often functioned in a scientific and technological vacuum. In addition to this organization scheme not being a particularly effective use of resources, it was not uncommon for duplication of services and facilities to be found within some institutions.

Another difficulty from the human resource standpoint was that many individuals who served in these settings felt like "second class citizens." Many of these staff, particularly those with higher professional degrees, were left with a feeling that, although their technical skills were generally being appropriately utilized and appreciated, their scientific skills and training were not. Needless to say, this is not an effective management approach for yielding optimal productivity from staff or for generating an environment conducive to job satisfaction.

NEW AGE BIOLOGY, NEW AGE CORES – ADVENT OF SYSTEMS BIOLOGY

In 2001, Ideker, Galitski, and Hood published a review that described a new approach for thinking about and investigating biological systems that they termed "Systems Biology."[1] The concept is that biological systems should be investigated in a holistic manner by analyzing "the gene, protein, and informational pathway responses; integrating these data and ultimately, formulating mathematical models that describe the structure of the system and its response to individual perturbations."[1] The genesis for this concept is unclear, but one can speculate that given the very close relationship and appreciation that Hood has had in the development of instrumentation and its role in the generation of reagents for the investigation of molecular systems as well as their analysis, he must have felt that the fields of biomedical and biological sciences now had the analytical armament to mount a systems approach to studying biology, and hence, it was appropriate to launch this field. [2,3] Embarking on such ambitious investigations demands effective evaluation of the projects from a multidisciplinary approach, often involving scientists with very different backgrounds. Such studies that utilize a systems approach require the design of experiments that move beyond the traditional boundaries of the typical institutional shared resource core. If institutions and their investigators are going to pursue a systems approach to study biological and biomedical questions, the current, often observed, paradigm of the shared resources functioning in the institutional research process by generating high throughput data-rich information as isolated technological and intellectual islands must evolve. Such an evolution must address several key features.

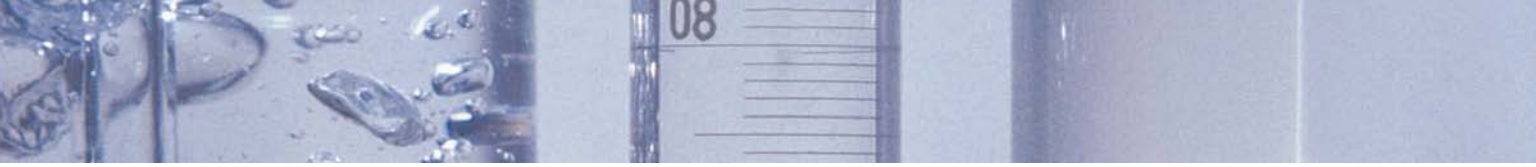
SHARED RESOURCE INTEGRATION, COMPUTATIONAL BIOLOGY AND BIOINFORMATICS

In most large research institutions, the day of "mom and pop" cores with one or two staff members operating in a scientific and administrative vacuum is no longer economically or scientifically viable. As biological studies shift from a reductionist to constructionist approach (i.e., the prelude to systems biology), there is an obvious need to integrate data from a number of technological platforms and experimental arenas.[4] Biologists need to collaborate widely with other scientists with different training in order to thoroughly address biological systems. Consider the advent of "-omics" – genomics, proteomics, interactomes, etc.; most biologists at the cutting edge of their field of interest in fact often approach their investigations exploring a variety of these "-omic" representations of a biological system. The obvious next step as outlined by Spence and Aurora[4] is the integration of data generated from the technological platforms that analyze the various "-omes."

Enter the disciplines of computational biology and bioinformatics. As the pressure to generate value-added information from these data-rich resources grows, many shared resources are beginning to develop computational and bioinformatics capabilities within their laboratories. This is an excellent initial approach to the problem, but as one can see, it is only temporary in that a second order value-added approach is ultimately required to support systems biology. This involves true integration across data generating platforms, and hence, across institutional shared resource boundaries. Thus, there is a need for a centralized computational biology/bioinformatics resource. These resources would function as a conduit from the shared resources to manage large databases, explore effective means for their integration to relational databases, and generate new, value-added/synergistic data from these to support a systems approach to biological studies.

INSTITUTIONAL ROLE IN EVOLVING SHARED RESOURCES TO SUPPORT A SYSTEMS APPROACH TO BIOLOGICAL STUDIES

As mentioned above, shared resources, particularly in aca-



demic settings, have traditionally functioned under the administration of the founding department or institutional research consortium, or in some cases, as a loose confederation of cores administered centrally from the institution's office for research. Recently, there have been a number of factors that have favored the movement to a more centralized, integrated approach to shared resource administration and management. First, and not surprisingly most effective in this process, are fiscal pressures. Most academic and industrial institutions are well aware of the critical importance of research infrastructure in the pursuit of innovative science. Research infrastructure plays a key role in investigator recruitment and retention in that most scientists recognize the importance of having such technological capability as key to the successful funding of their research proposals and execution of the experiments proposed. As noted, instrumentation for biomedical and biological research is becoming increasingly expensive to purchase and operate. Furthermore, institutions that are heavily vested into scientific instrumentation and technology are faced with the never-ending requirement of instrumentation up-grading and replacement on a four to eight year cycle. On the academic side, funding for such instrumentation is becoming increasingly difficult to secure. The traditional governmental sources for instrument funding, such as the National Center for Research Resources within the NIH and similar instrumentation programs at the National Science Foundation, have seen their ability to fund instrumentation decline due to increasing demand, increasing costs for instrumentation, and only modest increases in their budgets for such programs. Thus, institutions are forced to seek additional sources for funding instrumentation. All of these pressures may serve to galvanize institutions into revisiting their organization, administration, and management of shared resources so that they are more cost effective and are positioned to provide a systems approach for their researchers to investigate biological and biomedical problems.

One approach to integrating institutional shared resources is to consider an organizational structure for the shared resources without borders. What is meant by this, is that rather than an organizational structure represented by technological quantum that is somewhat isolated from another, a more fluid vision of the cores be taken that self-organizes shared resources with the experimental approaches investigators may take for a systems-type project. A simple example to demonstrate this concept would be the strategic combination of two traditional cores, such as proteomics and the other functional genomics utilizing microarray technology. Both make use of platforms that generate tremendous amounts of data. From the biological perspective, most investigators would have interest in knowing the relational status of a system's proteome and transcriptome.[5] In this situation, these cores can be virtually integrated by computational and bioinformatics tools to generate relational databases and value-added output for the investigators. Other integration points between additional platform-based shared resources can be imagined. The overall anticipated outcome for these approaches is two-fold: a synergism of expertise found in shared resources and an enhanced value-added product for the investigators, providing them with a more integrative, constructionist view of the biological system they are exploring. Furthermore, from a fiscal perspective, one can envision such approaches would lower costs in terms of shared resources, including staffing, equipment, instrumentation, management, etc., as well as potentially lowering the costs for providing such services to client investigators, a key factor in this time of static real-dollar support for biomedical research.

EFFECTIVE SHARED RESOURCE STAFF UTILIZATION

As noted above, integration, where feasible, of shared resources includes staffing. Rather than developing hard-boundaries around cores represented by organizations, management, staff, and technologies, institutions should explore integration sites among all of these factors. Fortunately, there does appear to be some changes in attitudes held by institutional investigators toward the scientists and technologists who staff shared resources. Researchers are becoming increasingly aware of their limitations in understanding the complex technological nuisances associated with many of the instruments used in current biomedical and biological investigations. Often, investigators do not fully appreciate what specific instruments can or cannot do, what appropriate scientific questions can be addressed by such instruments, what the format of the data may look like, and how that data can be effectively utilized in the resolution of the scientific question they are studying. Furthermore, most investigators simply do not have the time to invest in learning about the diverse set of instruments they would like utilized in their studies. Thus, many investigators are beginning to integrate shared resource staff, and consequently, their knowledge and expertise into the research process employed in their laboratories. The most effective use of such staff captures their expertise in the design of experiments, specifically in their development and execution, analysis of data, and computational and informatic resources. Ironically, this use of resource staff in a research process stream such as that described above gives rise to new ways of thinking about the management of resource staff and how they and their services are compensated.

Traditionally, many shared resources operate on a "fee for service" basis with compensation for staff directly based on their contribution to the specific service or product. The paradigm described above, where there is an increasing intellectual input into the scientific process by the shared resource staff member, presents a more difficult situation in terms of compensation. In the academic world, intellectual input into a process or the institution is highly esteemed but difficult to evaluate, thus, the fee for service model begins to breakdown.

One approach for resource staff as they become more actively engaged in the research projects of principle investigators is to have compensation for their efforts appear in the budgets of investigators' research proposals. A different approach would be for the institutions themselves to recognize and support the role of resource staff in terms of their close participation and integration into investigator's research projects and thus provide compensation for them not covered under the traditional fee for service model. Whatever the case, the traditional role of shared resource staff both in terms of their function in the research process and the mechanisms for supporting that role is changing; institutions should explore methods that compensate and validate resource staff in these changing roles, which leads to my final point, resource staff career tracks.

DEVELOPING THE RESEARCH RESOURCE CAREER TRACK

The value of career research resource staff seems to be better appreciated in the realm of industrial research compared to academic research. In industry, resource staff usually have a clearly defined research track that outlines what the career track is and how one can progress in that track. Most often, that is not the case in academia. Resource research staff, even those who hold higher degrees, generally do not have faculty appointments. Often they are on a non-faculty research appointment that usually has no real career track associated with it and no defined procedure or expectations for promotion. Perhaps in the past this has been an acceptable staffing model for scientists and technologists in resource laboratories, but with the increasing scientific, technological and intellectual demands placed on staff in shared resources, I would argue that, at best, it is outmoded and, at worse, institutions with this approach to resource staff will not attract or retain the best personnel, nor will they be able to achieve the type of integrated core structure that is critical for a systems approach to biological studies. One model for addressing these issues is the one my institution, the University of Virginia, has adopted for the staffing of senior leadership positions in our shared resources. Approximately ten years ago, the University of Virginia recognized the importance of the scientists and technologists in our shared resources to the research mission of the institution and that to fill these slots, a meaningful career track, in addition to equitable compensation, was needed. In light of this, our institution developed a Research Faculty for Service career track (http://www.healthsystem.virginia.edu/internet/faculty-dev/PandT/tracks/rfrs.cfm). Although this is a non-tenure track, it is different from the institution's research faculty career track with different expectations and milestones for promotion that are specifically tailored to the job functions faculty have when employed in shared resources. Certainly one can imagine other career track models that would be effective in shared resources, but whatever those may be, I would argue that any model which does not provide a dynamic career track with clear job expectations and guidelines for promotion will prove difficult to populate with engaged, vibrant scientists and technologists who enjoy and gain satisfaction from employment in a shared resource environment and wish to play an active role in the institution's research process.

NATIONAL RESEARCH RESOURCE CENTERS

The National Institutes of Health National Center for Research Resources (NCRR) supports approximately 40 biomedical technology resource centers throughout the United States along with its Biomedical Informatics Research Network (BIRN). The concept behind these programs is to offer the best technology and intellectual support to biomedical researchers; not unlike the philosophical underpinning of most academic shared resources. Thus, this calls into question the possibility of duplication of effort, resources, etc. Often, it is true that the resources available at the national centers may surpass those of the individual institutions, both in regard to instrumentation and perhaps expertise and one may question the value of the local efforts to develop and sustain institutional research resources in the face of such national centers. However, most institutions have come to realize the value of proximity in terms of such support. There is as yet, no totally satisfactory substitution for readily accessible, local technology and expertise provided under the collegial paradigm of an academic institution. Certainly the national centers are very important for some types of projects, most notably large scale or extremely complex investigations, but for the most part local support appears to be preferred by investigators. Therefore, in the conceivable future one may expect continued research support that is provided by both national centers and local shared resources. An interesting consideration is how interactions between such research support providers are integrated with the overall enhancement of product from both types of shared research facilities. What first comes to mind is integration at the level of computation, informatics, and databases. It will be interesting to follow these developments in the arena of the national centers. It is unlikely that institutions will close their shared resource support in favor of some distant national center. On the other hand, as new complex, extremely expensive instrumentation becomes available, it is likely that the paradigm of the national centers will remain. However, one might argue that these centers, in addition to providing support to investigators involved in complex investigations, should also be reaching out to provide support for local shared resources, perhaps an equally valuable function and a further justification for their existence.

SUMMARY

Shared resource laboratories in both academic and industrial settings have played a very important role in the biological and biomedical sciences for the past 40 years. Traditionally, these resources, within institutions, have been somewhat insular in regard to their interactions with both other resources as well as the investigators to whom they provided services and reagents. With the advent of high-throughput platforms that generate

large data streams from a variety of biological molecules and biological experiments, a systems approach to exploring medical and biological questions is becoming possible. However, for that to become practically feasible there must be an evolution in shared resource organization, management, and staffing that takes advantage of integration sites among shared resources for data integration, analysis, and value-added output in a systems format. Institutional leadership that wishes to promote a systems approach for their biological and medical research missions should begin to explore how to provide an organizational infrastructure for shared resources to evolve such that they can effectively become part of the scientific process, and hence, support such types of experimental approaches.

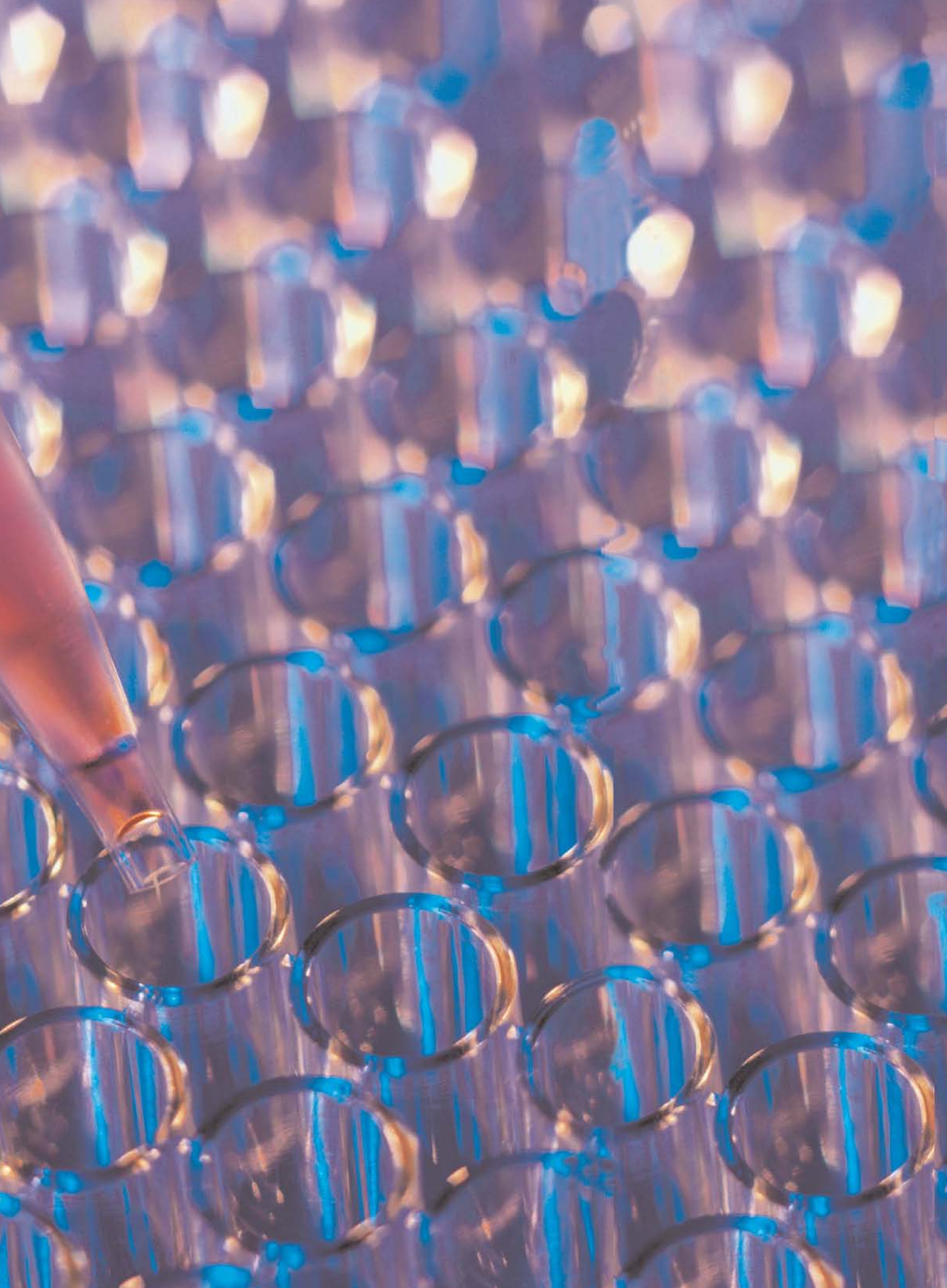
For more information on shared biomolecular research resources, the Association of Biomolecular Resource Facilities provides an excellent entry point into this arena of biomolecular sciences and shared resources (http.//abrf.org).

Acknowledgements: I would like to thank Dr. Nancy Denslow, University of Florida, for her suggestions and comments in writing this article.

REFERENCES

1. Ideker, T., Galitski, T. and Hood, L. (2001) "A new approach to decoding life: Systems Biology." Annu. Rev. Genomics Hum. Genet. 2:343-72.
2. Hunkapiller, M. W. and Hood, L. E. (1980) "New protein sequenator with increased sensitivity." Science, 207:523-5.
3. Kaiser, R. J., MacKellar, S. L., Yinayak, R. S., Sanders, J. Z., Saavedra, R. A., and Hood, L. E. (1989) "Nucleic Acids" Res. 17:6087-102.
4. Spence, P. and Aurora R. (1999) "From Reductionist to constructionist, but only if we integrate." Trends in Pharmainformatics (Suppl). pp. 37-39.
5. Stein, L. (2003) "Integrating biological databases." Nature Rev. Genetics 4:337-346.

Jay W. Fox, Ph.D*. is Professor of Microbiology, Asst. Dean for Research Support, at the University of Virginia, Department of Microbiology, PO Box 800734, University of Virginia, Charlottesville, VA 22908-0734. Jay can be reached at email: jwf8x@virginia.edu.*



USING BENCHMARKING METRICS TO improve laboratory productivity

OVER THE PAST FEW YEARS, NEARLY EVERY LABORATORY MANAGER HAS BEEN FACED WITH THE SEEMINGLY CONTRADICTORY DEMANDS FROM MANAGEMENT TO SHRINK BUDGETS AND FROM CLIENTS TO INCREASE SERVICES. IS IT POSSIBLE FOR A LAB MANAGER TO RESOLVE THIS CONTRADICTION TO MEET BOTH PERFORMANCE EXPECTATIONS? THE SOLUTION MAY BE THE SAME ONE THAT HAS DRIVEN ECONOMIC EXPANSION FOR YEARS—INCREASE PRODUCTIVITY. SINCE RESPONSIBLE MANAGERS HAVE WORKED TOWARD THIS GOAL FOR MOST OF THEIR CAREERS, THIS OPTION MIGHT BE EXPECTED TO HAVE LIMITED POTENTIAL BUT, THIS MAY NOT BE SO. ADDITIONAL GAINS MAY BE POSSIBLE WITH ACCESS TO RELIABLE, HIGH QUALITY INFORMATION TO GUIDE PERFORMANCE IMPROVEMENT INITIATIVES TO TRANSFORM UNDERPERFORMING ASSETS BY ADOPTING PROVEN BEST PRACTICES.

Metrics provide feedback on the performance of subsystems within an operational area and are a convenient way to compare models to identify best practices.

Lab managers believe that their labs operate at near top efficiency within available resources; if they believed otherwise, they would change the system to make it so. However, this belief is based mostly upon intuition, informal observation, or other qualitative, and often flawed, information—obviously, every lab can't be a top quartile performer. Good labs employ a variety of quality measures to indicate the state of operations[1] but even these quantitative measures only hint at the true quality of the results, leaving the performance grade subject to interpretation.[2] This is where benchmarking metrics come in—to provide an external standard for comparison. In common usage, benchmarking and metrics surveys are often used interchangeably, but, strictly speaking, these are quite different processes with different goals. Benchmarking aims to identify and implement global best practices to improve operational performance while metrics surveys measure the operational characteristics of systems for evaluation purposes. Benchmarking typically involves selection of a partner recognized for exceptional excellence in an area of interest and then assembling a team for a site visit for in-depth documentation of the best practices of their model. The partner company may be in the same industry or may be in an unrelated industry that utilizes processes that are similar—the oft cited examples of the latter strategy are Southwest Airlines partnering with Indy pit crews to learn how to rapidly turnaround their planes and Remington Rifle Company partnering with Mabelline (a cosmetics company) to learn how to make its shell casings shiny. Metrics provide feedback on the performance of subsystems within an operational area and are a convenient way to compare models to identify best practices.

When metrics reveal areas that are underperforming, the manager must decide among competing objectives to select the ones with the highest probability of delivering workable solutions. Ideally, the selections will take the lab along the optimum path directly to the best practices, but rarely does this occur. Most labs opt to search for their own solutions which can waste scarce resources, and, in the

Dr. Wayne Collins

end, still leave the system sub-optimized. This outcome might be avoided by selecting a willing partner recognized as having the best practice in the area of interest and organizing a benchmarking team to visit, observe, and collect ideas. This requires a considerable time commitment but is more likely to yield a better result than the first approach. A third option is to retain expert consultants who presumably have visited the top performing labs and have assembled an inventory of best practices. This is often the most cost effective and efficient option for focusing resources on the problem but the quality of the outcome is highly dependent on the quality of the consultants. Regardless of which strategy is pursued, benchmark metrics provide the basis for selection of objectives, setting realistic targets, and monitoring progress to insure that the lab advances in concert with comparable labs. Value is derived from integrating these efforts into annual performance contracts or other management systems favored by the lab.

THE METRICS SURVEY

Ideally, a metrics survey should probe into every aspect of operations to provide feedback that reflects performance of each system in a manner that facilitates comparison between operational models to allow identification of best practices. These measures must be monitored over an appropriate time interval to observe trends and relative rates of change in performance of the different models prior to selecting the superior performers. The systems typically examined by a comprehensive metrics survey instrument are listed in Table 1. Each of these systems will have multiple measures to examine every facet of its operational characteristics.

The second issue in using a benchmarked metrics survey approach is obtaining a statistically significant population of respondents for meaningful segmentation and analysis. The entire population of laboratories in the U.S. is estimated at between 25,000 to over 100,000. The survey organizer must have sufficient resources to reach a large portion of this population in order to segment into statistically significant peer groups. This hurdle can be lowered by applying the concept of differential segmentation—rather than segmenting laboratories based upon total operations, segment based upon similarities of individual systems. For example, safety metrics for a particular lab may be compared to one set of labs with similar safety issues while sample administration metrics for the same lab may be compared to a different set of labs. The key to using this approach is the ability to identify the specific system characteristics that define a particular segment to properly classify each lab.

The other element affecting the quality of a benchmarking metrics study is the report. It should present results in a concise manner that clearly indicates the relative position of the lab with respect to composite results of similar labs. Quantitative results are typically reported as the lab value along with the average, best quartile, and worse quartile composite scores. Charts or graphs that visually depict historical trends over several years are also essential for proper interpretation of the results. In addition, good reports will include comparisons of significant ratios and other combinations of metrics that reveal information on the interactions of laboratory systems as well as non-quantitative comparative data, reported without interpretation, to facilitate subjective evaluation of the maturity of cultural or human relations programs.

USING BENCHMARKING METRICS

In referring to metrics, Meyer says "…measures tell an organization where it stands in its effort to achieve goals but not how it got there or, even more important, what it should do differently."[3] Measures indicate a need for change but offer no clue as to how to adapt current practices or even if a completely different model should be adopted—these answers lie in the benchmarking process. By systematically studying the operations of the laboratories that achieve superior metrics, it is possible to accumulate an inventory of those elements that contribute to their success, (i.e., best practices.) Organizations that are able to identify and implement these practices achieve near best-in-class performance without the inefficiencies inherent in the usual trial-and-error approach. They may then elect to pursue one of two strategies—maintain a follower position by continually monitoring and copying the leaders within their peer segment, or adopt a leadership position by extending the current best practice. Either of these strategies requires some ingenuity since simply copying best practices is not likely to yield the same results in every lab due to organic and cultural differences in operational environment—best-in-class systems must be adapted to accommodate the individuality of the organization without losing the essence of what makes them successful.

DRIVING IMPROVEMENT AND PRODUCTIVITY

Most organizations formalize their annual objectives during the last quarter of the current year or the first month of the new year. The actual process has several variations depending upon current management fashion but the gist remains the same. Typically, broad, high level goals and objectives cascade down from executive management becoming more specific and detailed at each level so that individual personal objectives align with the organizational initiatives to insure that everyone works in concert — this is referred to as linkage. Laboratory objectives derived from this process generally fall into five categories:

- development of new services needed by the organization,
- cost reductions,
- improved system efficiency,
- cultural issues,
- and work safety initiatives.

Benchmarking metrics can play an integral role in selecting objectives in each of these areas, defining reasonable targets, and pointing to potential roadblocks or issues requiring management attention.

NEW SERVICES

Benchmarking metrics reflect the state of lab operations, give an indication of organizational readiness to take on new work, and hint at the likelihood of success. For example, if a particular lab lags its peer group in productivity measures, it is an indication of unused capacity that might be reclaimed through an improvement initiative to provide the resources to take on new work. Likewise, if a lab is leading in productivity measures, it may be an indication that current resources are fully utilized so that additional resources will be needed to take on new work. Other measures give an indication of the state of readiness of the instruments, need for additional capacity, or need for capital replacement. In all cases, benchmarking metrics alert the lab manager to the preferred areas to focus attention to assist the staff in completing their objectives and provide a basis for evaluating the probable success of each objective.

COST REDUCTIONS AND IMPROVED SYSTEM EFFICIENCY

Benchmarking metrics are an especially fertile source for gleaning ideas for cost savings initiatives. Underperforming operations usually imply excess costs and are opportunities to eliminate waste or to adopt a new system—and even the best labs are almost certain to have a few of these opportunities. Comparison with the best-in-class standard provides an estimate of the savings potential associated with each low performing area. Balancing savings potential with the effort and resources required for improvement yields net benefit for each project which can be displayed in a Pareto chart to evaluate and prioritize according to economic viability. The evaluation process should also compare the cost of purchasing external solutions with the opportunity cost incurred in using internal resources, (i.e., the value of alternative work that could be accomplished with the resources).

CULTURAL ISSUES

The effect of cultural issues on laboratory productivity cannot be overstated. The cooperation and support of the staff is the most critical element in meeting department goals and achieving excellent performance.[4] Lab managers typically try to build a positive culture through various programs to improve employee satisfaction and increase their involvement in the business. Benchmarking metrics can examine the range of these programs compared to the peer group but cannot judge their effectiveness—this requires polling the opinions of the staff. However, labs may use benchmarking metrics to judge whether they have the right balance of programs to address cultural and satisfaction issues in comparison to their peer group.

SAFETY INITIATIVES

The most important area to benchmark is laboratory safety. This responsibility is mandated by both regulatory requirements and moral imperative. The benchmarking survey examines legal compliance activities to identify deficiencies that might lead to enforcement actions and, more importantly, compares the scope of an orga-

Table 1. Areas to Address in Benchmarking Survey

- Safety
- Security
- Personnel Costs
- Culture
- Operational Costs
- Manpower Utilization Efficiency
- Capital Plan
- Equipment Utilization/Age
- Systems Effectiveness
- Training
- Services (in-lab, at-line, on-line)
- Quality systems
- Promotion Opportunities
- Sample Logistics System
- LIMS Usage
- Environmental/Disposal
- Validation/Regulatory Compliance
- Maintenance
- Organizational Structure (e.g., chemist/technician ratio)
- Authority Levels
- Types of Work at Each Level
- Use of Teams
- Management Systems/Tools (6 Sigma, Lean, etc.)
- Business Goal Linkage
- External Resources Utilized (outsourcing, calibration, etc.)
- Use of Statistical Controls
- Client/customer relationships
- Physical Facilities
- Procurement
- Seniority of Staff/Turnover
- Use of Temporary Labor
- Communication

nization's efforts to fulfill its moral obligation to protect the workers from harm with current industry best practices. Both types of measures are important in managing risk—organizations are subject to fines or prosecution for non-compliance and face substantial civil liability for failure to maintain a safe workplace. More importantly, striving for a world class safety program is simply the right thing to do.

CONCLUSION

Trends drawn from annual metrics studies tell laboratories whether they are lagging, matching, or surpassing the improvement rates of their peers which directly measures performance. This information is invaluable in celebrating successes or rousing the staff from complacency. Trending over multiple years is the best way to get an accurate assessment of performance and to insure that the laboratory maintains progress comparable to its peer group. Externally benchmarked metrics finally provide a reliable way for lab managers to grade their laboratory's performance and are an invaluable data feed into the performance management system.

REFERENCES

1. L.W. Collins, "Laboratory Quality Measures Revisited." Managing the Modern Laboratory, 1(3), 1995, 89.
2. L.W. Collins, "Grading Laboratory Performance." Managing the Modern Laboratory, 5(4), 2001, 77-80.
3. Meyer, C., "How the Right Measures Help Teams Excel." Harvard Business Review, 1994, May-June, 95-103.
4. L.W. Collins, "Managing Change." Managing the Modern Laboratory, 7(3), 2005, 54A-56A.

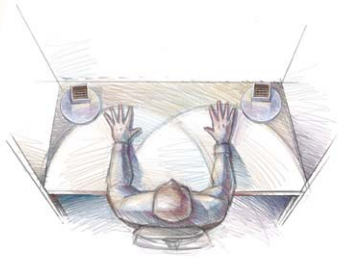
Dr. Wayne Collins, *Informatics & Services Division, Thermo Electron Corporation, 1410 Gillingham Lane, Sugar Land, TX 77478-2890; (713) 272-2282; (713) 272-2272; Wayne.Collins@thermo.com.*

Experience Ergonomics

Non- glare glass provides improved sight lines

Optional foot rest aids proper user in properly positioning legs and back.

Optional power-adjustable base stand provides correct knee-space for any user



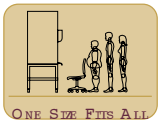
Large and easily accessable work area

Best Products, Best Performance, Best Protection

The Ergonomic Package: NuAire Class II Biological Safety Cabinet

Standard Ergonomic Features

Armrest
Extra large workspace
Cool non-glare white lighting
Frameless polished edge window
Staggered sidewall service valves
Centrally located Control Center
More knee space



Optional Ergonomic Features & Accessories

Automatic adjustable base stand
Adjustable footrest
Elbowrest
Foam armrest pads
Stainless steel turntable
Remote-controlled service valves
Optional: Flex-Duct, Flex-Hose, Transitions for exhausting
Biofit® ergonomic adjustable chair

www.nuaire.com
1.800.328.3352

2100 Fernbrook Lane
Plymouth, MN 55447 U.S.A.
Phone: 763.553.1270 Fax: 763.553.0459

Understanding ISO/IEC 17025

KNOWING THE PRINCIPLES BEHIND ISO/IEC 17025 CAN HELP LAB MANAGERS AND ASSESSORS UNDERSTAND THE INDIVIDUAL REQUIREMENTS OF THE STANDARD.

ISO/IEC 17025 is a standard that sets out the specific requirements to be met by laboratories wishing to achieve the production of competent results as a matter of course. These requirements were developed by groups of laboratory experts from around the world over the course of 30 years. From the first, laboratory competence has been the paramount consideration.

In today's world, recognition of such competence generally requires that laboratories which have implemented the requirements of the standard also work to obtain accreditation. Accreditation involves assessment and, like all audit-associated activities, assessment of technical competence requires trained assessors to deliver these assessments. Assessors must be fully cognizant of each of the requirements in the standard.

During the course of their work, assessors will often encounter situations where they are forced to defend particular requirements to a laboratory seeking accreditation and, while they understand the specific requirement under discussion, they may not be able to clearly articulate why such a requirement exists in the first place. That is to say — they may not be able to identify the principles which underlie the stated requirement.

ISO/IEC 17025 focuses on technical competence, not simple conformance.

At the same time, a laboratory's blind adherence to each of the requirements of the standard, while better than no system at all, is not an approach which instills confidence in their ability to produce competent results. Nor is it the best approach to use in acquiring recognition of such competence.

ISO 9000:2000 is now well-known and respected around the world as a standard which aims at having conforming organizations implement a "model for excellence." While some may see this aim as a very ambitious one for any organization, the standard effectively breaks down the elements which an organization can readily achieve in their implementation of such a model. One of the great strengths of ISO 9000:2000 is its clear basis on principles which can be easily articulated and understood.

Those who live and work in the world of laboratories also adhere to specific principles, but these have not been articulated in one collection. Such principles would provide a clearly understood basis for the requirements of the standard which most directly impacts laboratory operations.

J.E.J. (Ned) Gravel, CD, P.Eng, NQI-LA, CAE

The objective of this article is to provide a listing of the principles behind ISO/IEC 17025. These can be used by laboratories to better appreciate individual requirements of the standard. The article can also be used by assessors in understanding how or why a specific requirement can help (or perhaps hinder) a laboratory to implement the processes required for the recognition of their competence.

From study of the standard and its impact on laboratory operations over the course of the last twelve years, the following principles are considered to be the main forces behind all of the requirements of ISO/IEC 17025:

- Capacity
- Exercise of Responsibility
- Scientific Method
- Objectivity of Results
- Impartiality of Conduct
- Traceability of Measurement
- Repeatability of Test
- Transparency of Process

CAPACITY

Laboratories must have the resources (people with the required skills and knowledge, the environment with the required facilities and equipment, the quality control, and the procedures) in order to undertake the work and produce technically valid results.

EXERCISE OF RESPONSIBILITY

Persons in the laboratory organization must be allocated the authority to execute specific functions within the overall scope of work — and the organization must be able to demonstrate accountability for the results of their work.

SCIENTIFIC METHOD

Work carried out by the laboratory must be based on accepted scientific approaches, preferably consensus-based, and any deviations from accepted scientific approaches must be substantiated in a manner considered generally acceptable by experts in that field.

OBJECTIVITY OF RESULTS

Results produced within the scope of work of the laboratory must be mainly based on measurable or derived quantities. Subjective test results should be produced only by persons deemed qualified to do so and such results should be noted as being subjective, or known by experts in that field of testing to be mainly subjective.

IMPARTIALITY OF CONDUCT

The pursuit of technically valid results through the use of generally accepted scientific approaches is the primary and overriding influence on the work of persons executing laboratory tests and calibrations — all other influences should be considered secondary and not permitted to take precedence.

TRACEABILITY OF MEASUREMENT

The results produced, within the scope of work of the laboratory, must be based on a recognized system of measurement that derives from accepted, known quantities (SI system) or other intrinsic or well-characterized devices or quantities.

The chain of comparison of measurement between these accepted, known quantities or intrinsic devices or quantities, and the device providing objective results, must be unbroken for the competent transfer of measurement characteristics, including uncertainty, for the whole of the measurement chain.

REPEATABILITY OF TEST

The test which produced the objective results will produce the same results within accepted deviations during subsequent testing, and within the constraints of using the same procedures, equipment, and persons used during a previous execution of the test.

TRANSPARENCY OF PROCESS

The processes existent within the laboratory producing the objective results should be open to internal and external scrutiny. This is to identify and mitigate factors that may adversely affect the laboratory's ability to produce technically valid results, primarily objective and based on scientific method.

CONCLUSION

These eight principles may not cover every aspect of every requirement in the standard, but they are broad enough to allow persons working in laboratories to appreciate the reasons behind most of the individual requirements. They may also allow assessors to use their professional judgement in assessing the conformance of a laboratory to each of the requirements within the standard.

J.E.J. (Ned) Gravel *is the Manager, Quality and Training at the Canadian Association for Environmental Analytical Laboratories (CAEAL). The association is a public-private partnership which provides services to over 400 member laboratories including PT services, accreditation, and training. Ned represented Canada on ISO/CASCO Working Group 10 — the group which developed ISO/IEC 17025, and Working Group 25 — the group which was assigned the task of aligning ISO/IEC 17025 with ISO 9000:2000.*

Canadian Association for Environmental Analytical Laboratories Suite 310, 1565 Carling Avenue, Ottawa, ON K1Z 8R1, Canada; (613) 233-5300; www.caeal.ca.

Need directions to laboratory productivity?

Thermo has the road map.

Thermo Electron Corporation introduces two new services to point the way out of the budget squeeze through increased productivity.

The **Thermo Laboratory Benchmarking Metrics Survey** compares performance over all aspects of operations with lab peer groups to identify opportunities for improvement as well as areas for recognition.

Thermo Laboratory Management Workshops apply proven management concepts to the lab environment while providing a convenient forum to exchange experiences with fellow lab managers. Delivered to a location near you with a money-back satisfaction guarantee!

Call us today at 713-272-2282 or e-mail wayne.collins@thermo.com for additional information or visit us at PittCon, Booth 3733, March 12-17, 2006.

Analyze · Detect · Measure · Control™

Thermo
ELECTRON CORPORATION

Show me a lab that enjoys **perfection in liquid chromatography**, and I'll show you a lab with an **intelligent solution from Dionex.**

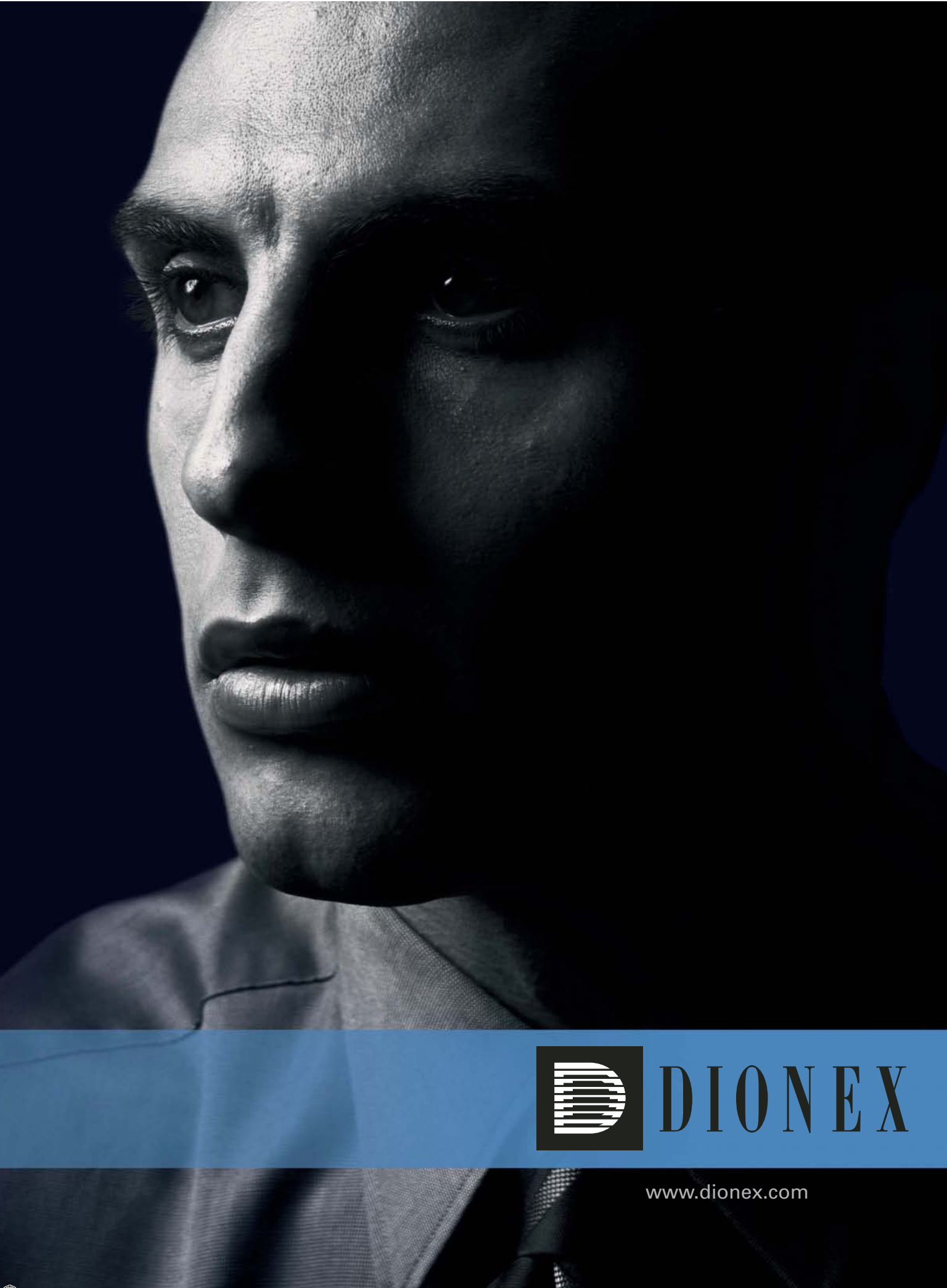
Passion for liquid chromatography is our key to developing innovative liquid chromatography solutions for over 30 years. We deliver the industry's most robust IC and HPLC platforms. Genuine quality, superior resolution, and consistent reproducibility.

Power behind our products is fueled by partnering with you and to tailor a complete solution for your specific applications. Dionex offers a large suite of the world's most widely used IC systems. Also, the intelligent, new UltiMate™ 3000 HPLC System gives you a broad range in flow flexibility—from preparative to nano—and hard-working dual-pump options which give you two HPLCs in one.

Productivity substantially increases with Chromeleon®, the most streamlined Chromatography Management software. Together with our market-leading hardware, we provide an intelligent solution that improves your performance with each application.

We understand the value in having the answer to your specific research questions. With flawless performance. Time after time.

Passion. Power. Productivity.



DIONEX

www.dionex.com

lab agenda

MARCH 12-17, 2006
57th Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy
Orlando, Florida
www.pittcon.org

MARCH 17, 2006
Training: The Building Block to a Successful Laboratory Animal Program
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

MARCH 23, 2006
Creative Online Ways to find Talent for Your Lab or Controlled Environment
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

MARCH 26-30, 2006
American Chemical Society Meeting and Exposition
Atlanta, GA
www.acs.org

APRIL 1-5, 2006
Experimental Biology 2006
Federation of American Societies for Experimental Biology
San Francisco, CA
www.faseb.org

APRIL 13, 2006
Managing R&D Staff Reductions: Before, During and After
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

MAY 1, 2006
Best Security Strategies and Practices for Labs and Controlled Environments
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

MAY 18, 2006
Managing Contingent Workers and Independent Contractors In Your Lab or Controlled Environment
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

MAY 21-25, 2006
American Society for Microbiology 106th General Meeting
Orlando. FL
www.asm.org

JUNE 1, 2006
Congratulations, You're a Supervisor. Now What? Proven Rules New Managers Should Know
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

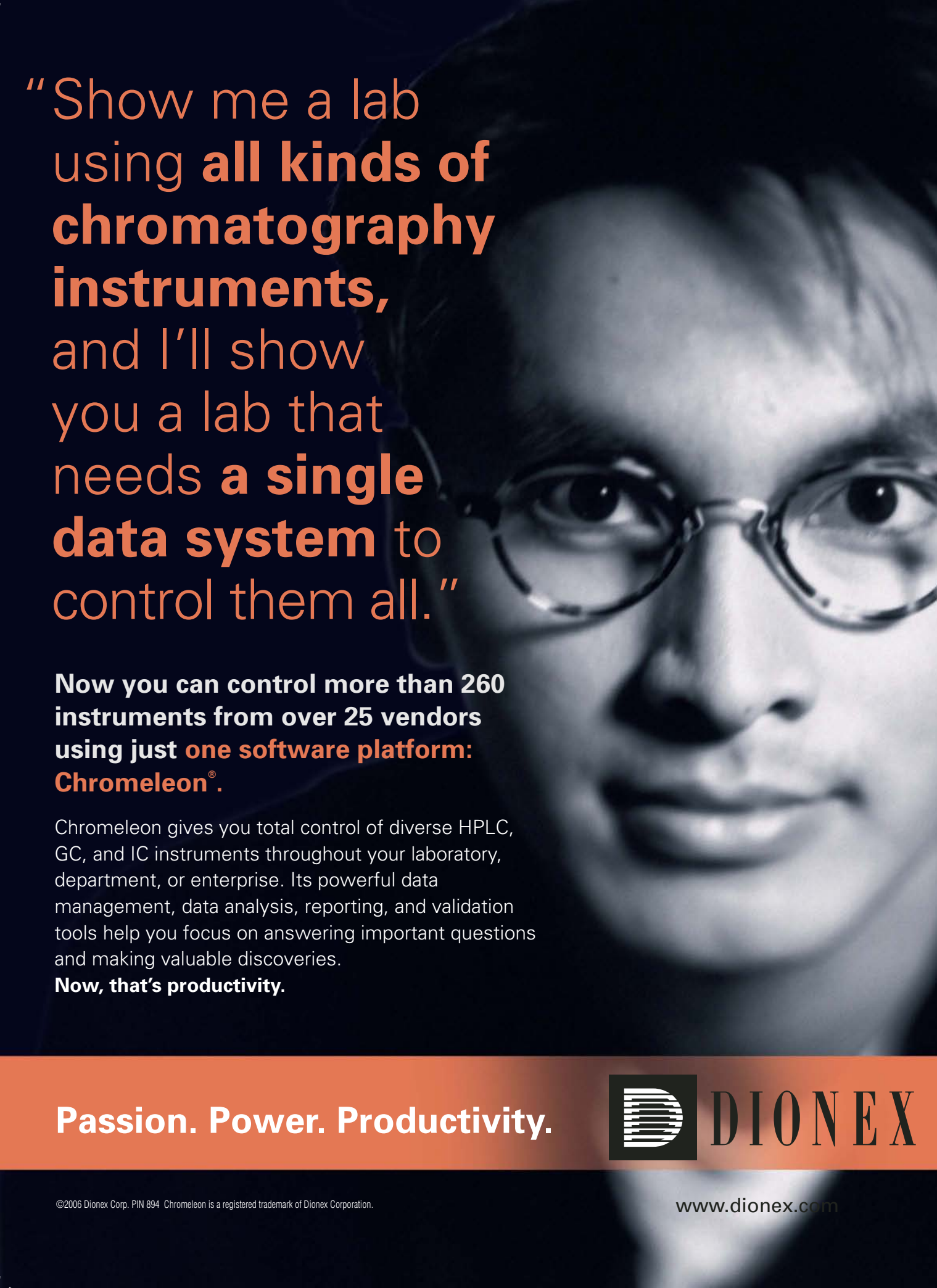
JUNE 8, 2006
Using the Internet to Improve Productivity in Laboratory Environments
Audio Seminar -
1:00 PM EST
www.viconpublishing.com

JULY 23-27, 2006
AACC 2006 Annual Meeting and Clinical Lab Exposition
American Society for Clinical Chemistry
Chicago, IL
www.aacc.org

AUGUST 7-10, 2006
DDT 2006
Drug Discovery Technology and Development
Boston, MA
www.drugdisc.com

OCTOBER 15-18. 2006
49th Annual American Biological Safety Conference
Boston, MA
www.absa.org

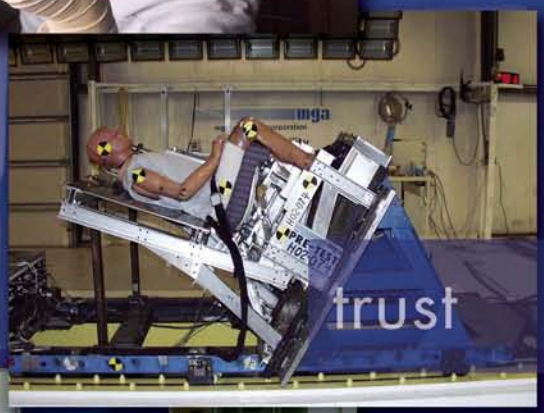
To have your event listed here, please send the information to editors@labmgr.com


"Show me a lab using all kinds of chromatography instruments, and I'll show you a lab that needs a single data system to control them all."
Now you can control more than 260 instruments from over 25 vendors using just one software platform: Chromeleon®.
Chromeleon gives you total control of diverse HPLC, GC, and IC instruments throughout your laboratory, department, or enterprise. Its powerful data management, data analysis, reporting, and validation tools help you focus on answering important questions and making valuable discoveries.
Now, that's productivity.
Passion. Power. Productivity.
DIONEX
©2006 Dionex Corp. PIN 894 Chromeleon is a registered trademark of Dionex Corporation.
www.dionex.com

The American Association for Laboratory Accreditation

Promoting Confidence Through Accreditation Since 1978

confidence



trust

integrity

Photo Credits: Copyright Bionetics Photo Services and the U.S. Air Force Primary Standards Laboratory and MGA Research

Accreditation programs available based on the most rigorous internationally recognized standards

Programs available for all types of:

- Laboratories (Testing/Calibration)
- Reference Material Producers
- Proficiency Testing Providers
- Inspection Bodies
- Product Certification Bodies

Broad Recognition (Domestic & International)

Training Courses Offered:

- ISO/IEC 17025 and Accreditation
- Introduction to Measurement Uncertainty
- Assessment of Laboratory Competence
- Quality Assurance Analysis Tools for Calibration and Testing Laboratories

For more information:
www.a2la.org/training/course_schedule.cfm

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704 • 301-644-3248
WWW.A2LA.ORG

Glenn Ketcham, CIH and Vince McLeod, CIH

OSHA and the lab

IN ALL THE HUSTLE OF LOADING THE AUTOSAMPLER, PIPETTING, POURING, AND MIXING FOR EXPERIMENTS, WORKER HEALTH AND SAFETY CAN GET OVERLOOKED. UNDERSTANDING THE REQUIRED OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) PROGRAMS AND RECOGNIZING HAZARDS WILL HELP YOU TO IDENTIFY AND MINIMIZE MANY OF THE COMMON SAFETY AND HEALTH HAZARDS ASSOCIATED WITH RUNNING A LABORATORY. TO ASSIST YOUR NAVIGATION OF THE HEALTH AND SAFETY MAZE ARE THE "SAFETY GUYS."

Welcome to the inaugural issue of *Lab Manager*. We know running a lab is a challenge to say the least. Often health and safety inadvertently get pushed aside or forgotten, sometimes with dire consequences. So, in this first column we want to present an overview of the most common hazards encountered in typical labs. Our hope is that one or more topics might "strike a nerve" and open a dialogue as we try to answer your questions in coming issues.

OSHA tells employers that we must provide a workplace "free from recognized hazards." There are many specific OSHA standards that may apply to laboratories. Most notable is 29CFR1910.1450, "Occupational exposure to hazardous chemicals in laboratories," also known as the OSHA Lab Standard.[1] Other standards include hazard communication, respiratory protection, electrical, and fire safety. In addition, there is a "general duty clause" [Section 5(a)(1)] which covers all other recognized hazards for which specific standards may not exist such as ergonomics and exposures to anesthetic gases or experimental drugs.

DIFFERENT TYPES OF HAZARDS

An important first step in protecting worker health and safety is to recognize workplace hazards. Most hazards encountered fall into three main categories: chemical, biological, or physical. Cleaning agents and disinfectants, drugs, anesthetic gases, solvents, paints, and compressed gases are examples of chemical hazards. Potential exposures to chemical hazards can occur both during use and with poor storage.

Biological hazards include potential exposures to allergens, infectious zoonotics (animal diseases transmissible to humans), and experimental agents such as viral vectors.

The final category contains the physical hazards. The most obvious are slips and falls from working in wet locations and the ergonomic hazards of lifting, pushing, pulling, and repetitive tasks. Other physical hazards often unnoticed are electrical, mechanical, acoustic, or thermal in nature. Ignoring these can have potentially serious consequences.

CHEMICAL HAZARDS

Use of chemicals in laboratories is inevitable and the potential for harm or injury could be significant if they are misused or mishandled. OSHA has developed two important standards to help mitigate these potential problems. First is the Hazard Communication standard (29CFR1910.1200). Formerly known as the "Right-to-Know," it deals with employers' requirements to inform and train employees on non-laboratory use of chemicals. This would apply to things in the lab such as pump oil, Chromerge, or liquid nitrogen used in dewars. Although these chemicals are found in the lab, their use does not meet the criteria for laboratory use.

The second we've already mentioned, known as the "OSHA Lab Standard," 29CFR1910.1450, requires laboratories to identify hazards, determine employee exposures, and develop a chemical hygiene plan (CHP) including standard oper-

Inadequate insulation leads to injuries

Improper extensions and outlets are shocking.

Poor chemical storage can burn you.

A lack of labeling can leave you lamenting.

ating procedures. The Lab Standard applies to the laboratory use of chemicals and mandates written standard operating procedures (SOPs) addressing the particular hazards and precautions required for safe use. This goes hand-in-hand with experimental design and planning. Chemical safety will be examined in detail in future articles. Both standards recognize the need for material safety data sheets and employee training.

BIOLOGICAL HAZARDS

Biological hazards can take the form of microbes, recombinant organisms, or viral vectors. They can also take the form of biological agents introduced into experimental animals. Issues such as containment, ability for replication, and potential biological effect all come into play. When designing experiments ensure procedures can be conducted safely. When institutional approval is necessary make certain all the bases are covered.

The most prevalent biological hazards, in terms of frequency of occurrence, are simple allergens associated with the use and care of laboratory animals. Health surveys of people working with laboratory animals show that up to 56% are affected by animal-related allergies. In a survey of 5,641 workers from 137 animal facilities, 23% had allergic symptoms related to laboratory animals. These figures do not include former workers who became ill and could not continue to work.

PHYSICAL HAZARDS

Labs inherently have significant physical hazards present. Included here are electrical safety hazards, ergonomic hazards associated with material and equipment use and lifting, handling sharps, and basic housekeeping issues.

Electrical Hazards

Electrical hazards are potentially life threatening yet are found much too frequently. First, equip all electrical power outlets in wet locations with ground fault circuit interrupters, or GFCI, to prevent accidental electrocutions. GFCIs are designed to "trip" and break the circuit when a small amount of current begins flowing to ground. Wet locations usually include outlets within six feet of a sink, faucet, or other water source, and outlets located outdoors or in areas that get washed down routinely. Specific GFCI outlets can be used individually or install GFCI in the electrical panel to protect entire circuits.

Another very common electrical hazard is improper use of flexible extension cords. Do not use these as a substitute for permanent wiring. The cord insulation should be in good condition and continue into the plug ends. Never repair cracks, breaks, cuts, or tears with tape. Either discard the extension cord or shorten it by installing a new plug end. Take care not to run extension cords through doors or windows where they can become pinched or cut. And always be aware of potential tripping hazards when using them. Use only grounded equipment and tools, and never remove the grounding pin from the plug ends. Also, do not use extension cords in series; just get the right length cord for the job.

Use of hanging pendants and electrical outlets are widespread in labs to help keep cords off floors and out of the way. Check electrical pendants for proper strain relief and type of box used. The box should be totally closed and without any holes. If it contains knockouts or holes for mounting it is not the right type for a hanging pendant.

Haphazard housekeeping hinders performance.

Uncontrolled sharps collection is sticky business.

As a final check for possible electrical hazards, look over your lighting. Protect all lights within seven feet of the floor to guard against accidental breakage. Slip plastic protective tubes over fluorescent bulbs prior to mounting or install screens onto the fixtures.

Awkward Postures, Material Handling, and Repetitive Motion

Many operations in the lab can result in lab workers assuming sustained or repetitive awkward postures. Examples are eluting a column in a fume hood, working for extended periods in a biosafety cabinet, or looking at slides on a microscope for extended periods. What is found acceptable for an occasional use may become problematic if used frequently. Pain is a good indicator something is wrong. Conduct work with a neutral balanced posture. Magnetic assist or programmable pipettes can reduce frequency or hand force required to prevent worker injury. Again we will examine laboratory ergonomics in detail in future issues.

Sharps

Sharps containers are ubiquitous in labs and following a few safety rules can help prevent getting stuck with accident reports. Use only puncture-proof and leak-proof containers that are clearly labeled. Train employees never to remove the covers or attempt to transfer the contents. Make sure they are only used for "sharps" and they get replaced when three-fourths full to prevent overfilling.

Housekeeping

Many injuries stem from poor housekeeping. Slips, trips, and falls are very common yet easily avoided. Start with safe and organized storage areas. Material storage should not create hazards. Bags, containers, bundles, etc., stored in tiers should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. Keep storage areas free from accumulation of materials that could cause tripping, fire, explosion, or pest harborage.

CONCLUSION

Laboratories present many challenges. In the day-to-day bustle, worker health and safety can be easily overlooked. However, with proper guidance, a trained eye, and practice in noticing the mundane, we can find and correct many common mistakes and prevent illness or injury. The Internet provides a vast amount of valuable information easily researched. Begin with the OSHA website (www.osha.gov) and chances are you will find what you need. Be diligent and remember "Safety First!"

1. OSHA. "Occupational Exposure to Hazardous Chemicals in Laboratories," 29CFR1910.1450. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS& p_id=10106

Glenn Ketcham *is a Certified Industrial Hygienist with 22 years experience in the health and safety field. He is currently the Risk Manager for the University of Florida with responsibility for the loss prevention, ergonomics, disaster preparedness, and the occupational medicine surveillance programs. He has managed the laboratory safety programs for both the University of California, San Diego (UCSD) and the University of Florida. In addition, he served as an industrial hygienist with federal OSHA compliance and has a Masters Degree in environmental engineering sciences with a health physics concentration.*

Vince McLeod *is a Certified Industrial Hygienist and the senior IH with the University of Florida's Environmental Health and Safety Division. He has 17 years of occupational health and safety experience in academic research with focus in the research laboratory. His specialties are in hazard evaluation and exposure assessments.*

The Safety Guys welcome your comments and questions. You can email them at thesafetyguys@labmgr.com.

PITTCON

product showcase

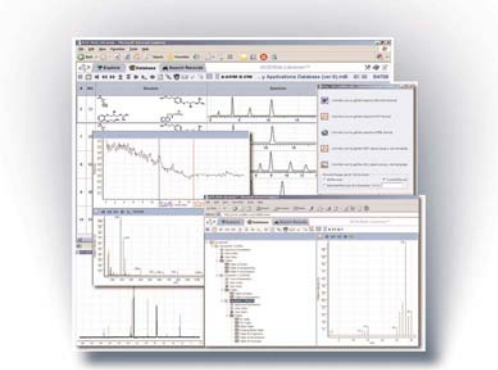
APPI for LC/MS

PhotoMate® APPI® sources detect a wide range of compounds that are easily missed or poorly detected by ESI and APCI. APPI provides the benefits of ionization of a broad range of (e.g., non-polar) compounds, low ion suppression, large linear dynamic range, positive and negative ion modes, dual ionization capability, and sensitivity over a wide range of flow rates. Syagen Technology www.syagen.com

Washer

Hotpack Vertical SpaceSaver™ Washers fit small floor space requirements, typically 35% less than most models. Units can be loaded without bending and automatically dispense detergent and neutralizer, providing convenience and efficiency. Select from preprogrammed wash cycles or custom program cycles to fit your needs. Options include specialty baskets, a separate DI pump, and HEPA drying package. SP Industries www.spindustries.com

Access Software



ACD/Web Librarian is browser-based software that allows chemists to access analytical results from anywhere via the Internet or corporate intranet, search and retrieve information by spectral parameters or chemical structures, and create reports on the spot. New capabilities of version 9 include enhanced viewing of hyphenated datasets (LC/MS, etc.) and images. ACD/Labs www.acdlabs.com

Microwave Sample Processing

UltraCLAVE removes the limitations of standard microwave labstations by combining direct microwave heating in a high pressure reactor which acts simultaneously as the microwave cavity and reaction vessel. This allows for larger sample masses, larger batch sizes, and higher temperatures and pressures. It offers high-throughput digestion and extraction, as well as scaling-up synthetic reactions. Milestone www.milestonesci.com

Particle Analyzers

GRADEX® 2000 Particle Size Analyzers are patented PC-controlled devices which fully automate the sieve analysis process. The GRADEX 2000 provides analysis and complete data printouts automatically in the lab or on the plant floor. The GRADEX 2000 is engineered to provide dependability and low maintenance operation. ROTEX www.rotex.com

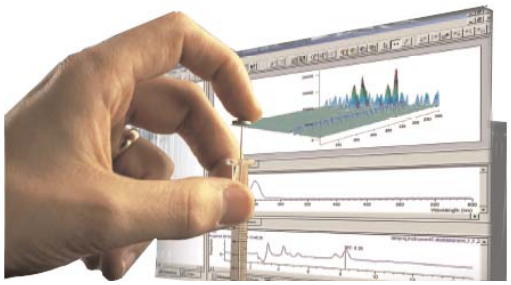
HPLC Controller

The CBM-20 HPLC controller allows researchers to use their networks to control and monitor their Prominence HPLC system. Users can easily check the status of all networked HPLC systems, enabling centralized administration. The CBM series can act as an interface for connecting LC workstations, network-client computers, and analytical instruments via Ethernet. An XML-based interface allows users to set-up, control, monitor, and maintain their HPLC remotely. Shimadzu Scientific Instruments www.ssi.shimadzu.com

High Purity Acids

OmniTrace® and OmniTrace UltraTM high-purity acids for trace metal analysis. AAS, GFAAS, ICP-OEM, and ICP-MS techniques all require the highest levels of purity in acids used for sample preparation. All OmniTrace UltraTM products are double distilled, packaged in Class 100 clean-room conditions, and tested to parts per trillion levels. EMD Chemicals www.emdchemicals.com/analytics

Productivity Datasheet



A new document, "Atlas CDS - A scalable, compliant and integrated chromatography data system," is available free of charge to chromatographers working in both regulated and non-regulated industries. It addresses the benefits of standardizing on a single solution, and provides information designed for multi-channel, multi-user client server implementations. The user-friendly format enables increased lab productivity and advanced graphics help maximize the amount of information gained from data. Thermo Electron www.thermo.com

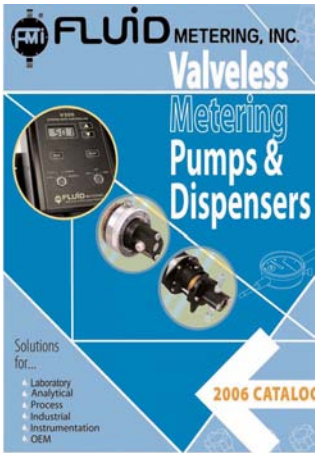
Generators

ZERO AIR generators produce a continuous flow of clean, dry air with an ultra low residual methane content of less than 0.1ppm from an existing compressed air supply. Six new models are available with flow rates ranging from 1.0L/min to 20L/min. An interchangeable top panel allows for direct mounting of a hydrogen generator, to provide an all-in-one flame gas solution (FID Station) for GC-FID, FPD, and NPD applications. domnick hunter www.domnickhunter.com

Filtration Cartridge

The BioPak disposable ultrafiltration cartridge dispenses ultrapure water for up to three months without a loss of flow rate. The cartridge connects to the outlet of any Milli-Q®, Direct-Q®, or Synergy® water purification system as a final purification step. Typically, BioPak cartridges are used in cell culture, biochemistry, or molecular biology applications. Millipore www.millipore.com

product news

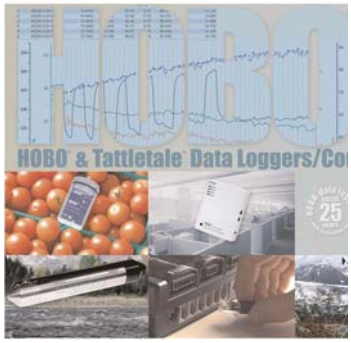


DISPENSERS AND PUMPS CATALOG

This 36 page catalog covers precision dispensers and metering pumps for laboratory, industrial, process, and OEM applications. It includes enhanced pump head information and intuitive product page layout simplifying pump selection. Also included is the V300 Variable Speed Pump Controller which features front panel membrane switches for flow control, large LCD flow rate display, and multiple analog input capabilities. Fluid Metering www.fmipump.com

PRODUCT CATALOG

This catalog offers detailed product descriptions, specifications, and prices for Onset's full line of PC and Mac-based HOBO® data loggers, weather stations, and Tattletale® logger-controller products. A number of new hardware and software products are highlighted, including the HOBO FlexSmart Logger for energy monitoring, and new alarm software that provides real-time notification of environmental conditions via email, pager, and text messaging. Onset Computer www.onset-comp.com



CHAIR CONFIGURATOR

The Build Your Own Chair Configurator allows you to design ergonomic chairs to meet your specifications for laboratory applications. Customers can see how different chair components and options would look and perform in their particular applications. After a new chair is configured online, a customer can email the result to BioFit for a price quote. BioFit www.biofit.com

TANGENTIAL FLOW FILTRATION

The Pellicon® XL Devices are available with a choice of either Durapore® PVDF membrane (microporous), Ultracel® regenerated cellulose membrane (ultrafiltration) or Biomax® polyehtersulfone membrane (UF), and membranes for concentrating and desalting from 100 milliliters to 2 liters of protein-containing solution. Compared to large stirred cell systems, these devices offer better flow rates with less processing time. Millipore www.millipore.com

WORKBENCH

The Model DNL Dimension Next Laboratory Modular Technical Systems are available in both single-sided and double-sided versions. Features include a heavy-gauge steel frame that bolts to the top supports, adding strength to the work surface and lateral support to the entire station. The 1000-pound capacity of the work stations ensures that even the heaviest jobs can be accommodated. Pro-Line www.1proline.com

HOT PLATES/STIRRERS

These units feature digital display of temperature power settings and two memory keys for storing and recalling favorite settings. In the interest of safety, there is a plate "hot" indicator that stays activated even after the unit is turned off if the plate remains above 50°C. Torrey Pines www.torreypinesscientific.com

REFERENCE STANDARDS

The TAN and TBN reference standards are intended for petrochemical analysis by potentiometric titration. This comprehensive new range of high quality standards may be used to verify system functionality and assure accuracy of laboratory test equipment. The TAN series is fully traceable and is tested and certified in accordance with ASTM D 664/IP177. The TBN series is also fully traceable and is tested and certified in accordance with ASTM D 2896/IP 276. VHG Labs www.vhglabs.com

WATERPROOF PH METER

This pH Meter is microprocessor controlled and housed in a rugged, waterproof casing that can withstand the elements. The auto-instruction feature guides the user through a simple calibration procedure – including NIST buffer calibration at 6.86 and 9.18 in addition to the standard 4.01, 7.01, and 10.01. Harvard Apparatus www.harvardapparatus.com

product news continued

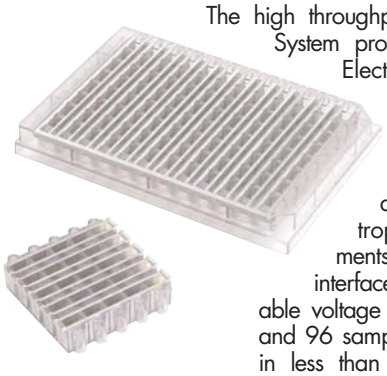
CLEANUP COLUMNS

CUKEs™ are manufactured according to USDA specifications and consist of a polypropylene syringe barrel filled with chemically modified silica gel. They permit chemical cleanup procedures for the quantitation of aflatoxins in major important agricultural commodities. These commodities include corn meal, cottonseed, peanuts, almonds, english walnuts, brazil nuts, and pistachio nuts.
Aura Industries www.aura-inc.com

COMPOUND MICROSCOPES

The BC Series Upright Compound Microscope is a series of microscopes specifically designed for the demanding research environment. The modern frame provides enhanced stability for high quality photomicroscopy. The ergonomic single hand focus/stage controls increase workflow while minimizing fatigue. The true Kohler Illumation features a field diaphragm and a 20 watt, 6 volt halogen bulb with an electronic dimmer. Jenco www.jencointernational.com

ELECTROPORATION SYSTEM



The high throughput Electroporation System provides a 96 Well Electroporation Plate and the 96 Well Plate Handler that can be used to design and optimize electroporation experiments. The user friendly interface allows for variable voltage and pulse length, and 96 samples are processed in less than one minute. BTX www.btxonline.com

DIGITAL IMAGING SYSTEM

The Gel Logic 2200 Digital Imaging System features a cooled CCD camera and an integrated illumination cabinet to permit the sensitive detection of fluorescent, chemiluminescent, and chromogenic assays. The system includes a 2.2 million-pixel sensor, an f 1.2 lens, and 6x optical zoom to deliver highly accurate and sensitive 16-bit image-capture for quantitative imaging of electrophoresis gels, blots, plates, and assays. Kodak www.kodak.com

PIPET-AID

The Portable Pipet-Aid® XL has a longer lightweight handle which lowers the arm lift required to perform the same pipetting operation as with a conventional pipettor. The lower, more comfortable arm position reduces shoulder and neck strain particularly when working under a hood. The ergonomic design also includes an adjustable hand rest and a removable stand which enables the unit to be set down without contaminating the pipet. Drummond www.drummondsci.com

COUPLINGS

The PMC12 quick disconnect coupling with an integrated ¼-28 flat bottom port is compatible with standard HPLC type fittings. It eliminates the need to thread and re-thread a separate fitting whenever the line is disconnected. With this design, after the initial threading of the nut into the 1/4-28 port, the coupling enables the user to connect and disconnect the line repeatedly without the need to re-thread. Colder Products www.colder.com

Introducing something totally new to DNA/RNA and Protein purification.

Ease.

Nucleic acid and protein purification is a vital step in virtually every life science application. But that doesn't mean it can't be easy. That's the thinking behind our new PrepEase™ kits. Easy, familiar methods. Easy-to-understand protocols. Manufactured and tested under the ISO 9001:2000 quality standard. And all from a supplier that's easy to work with. So whether you're doing plasmid and BAC purification, gel extraction, RNA purification, sequencing dye clean-up, or protein extraction – do it with ease. PrepEase™.

To order or find out about our PrepEase Perks Program™, visit usbweb.com/prepease or call 800-321-9322.

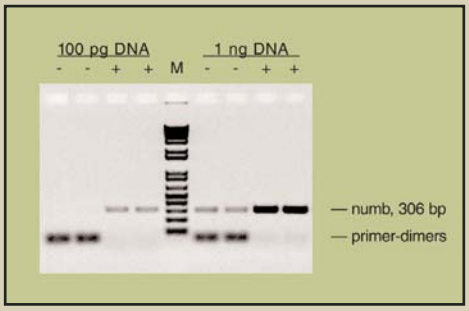
FUELING INNOVATION usb

How it Works

Primer Sequestration

Problem: In general, hot start PCR methods reduce or eliminate non-specific primer-extension products formed at lower temperatures during PCR assembly. At these less stringent annealing temperatures, primers may bind non-specifically, which often leads to unwanted amplification products and primer-dimers.

Solution: In order to resolve this problem, USB has introduced HotStart-IT™ which is a combination of high-quality USB Taq DNA Polymerase with a recombinant, unique protein which binds and sequesters primers at lower temperatures. This primer-sequestration technique effectively blocks DNA synthesis from mis-priming events at lower temperatures and prevents the formation of primer-dimers. When PCR is initiated, the protein is inactivated during the heat denaturation step and the primers are free to participate in the subsequent amplification cycles.



Increased specificity of HotStart-IT ™ Taq DNA Polymerase. Results demonstrate a shift from mainly primer-dimers to the desired product when HotStart-IT Taq DNA Polymerase is used.

This hot start method enhances many complex PCR reactions by increasing both specificity and yield. Since no Taq antibody is used it eliminates animal-sourced biologicals and mammalian contamination. This risk of DNA damage associated with chemically modified hot-start enzymes is eliminated because there is no extensive heat denaturation step required. Undesired PCR products are virtually eliminated. The result is higher specificity, higher yield, and a higher level of confidence.

HotStart-IT™ Taq DNA Polymerase is designed for room temperature reaction set-up and is thoroughly tested for purity and performance. It is supplied with a 10X PCR Reaction Buffer and a separate tube of 25mM $MgCl_2$.

USB also offers a pre-mixed formulation with HotStart-IT™ Taq Master Mix (2X) which combines high-quality USB recombinant Taq DNA Polymerase, a recombinant hot start protein, and USB Ultrapure nucleotides in a proprietary reaction buffer. This ready-to-use mix provides reliable performance for PCR applications in which high specificity and high sensitivity are desired. Since the mix is pre-formulated, experimental variability is significantly reduced.

For more information on the HotStart-IT™ Taq DNA Polymerase from USB, go to www.usbweb.com.

news notes

ARTEL AND CALIPER PARTNER TO ENHANCE LABORATORY DATA INTEGRITY

ARTEL and Caliper Life Sciences announced a technology partnership to strengthen quality assurance for automated liquid delivery systems used in the laboratory. As a result of this collaboration, Caliper will now conduct in-house testing on its automated liquid handlers, such as the Sciclone and RapidPlate, using ARTEL's Multichannel Verification System (MVS). Caliper's customers benefit from third party verification of equipment performance, as well as the provision of an equipment optimization technology and standard method validation tool that can be integrated into their own laboratories. This partnership leverages ARTEL's expertise in low volume measurement and Caliper's automated liquid handling capabilities.

AEI ACQUIRES NORGREN SYSTEMS

AEI (Appalachian Electronic Instruments, Inc.) – a manufacturer of electro-mechanical systems for various industries including mining, textiles, and medical devices – has acquired the assets of Norgren Systems. Based in Mountain View, CA, Norgren Systems developed laboratory automation equipment primarily for proteomics research including ultra high-speed colony pickers and colony spreaders. AEI will continue the Norgren Systems brand and products immediately adding third-party services such as contract field service, warranty service, as well as contract manufacturing and redesign services. Norgren Systems will operate out of AEI's Fairlea, West Virginia headquarters.

ACD/LABS EXPANDING TO UK

Advanced Chemistry Development, Inc., (ACD/Labs), of Toronto, Canada announced that they are expanding their direct presence in Europe by opening an office in the United Kingdom. The office in the UK will serve local pharmaceutical, chemical, environmental, and academic markets, providing customers with direct access to ACD/Labs' technical sales, support, and software development services. The UK office will be initially staffed with a team of professionals who have in-depth knowledge of the region, and who are already experienced with ACD/Labs' products. ACD/Labs will now be able to offer a complete range of business and technical services, and provide a faster response to the needs of their customers.

NEW PRODUCTIVITY OFFERINGS FROM THERMO ELECTRON

Thermo Electron Corporation introduced two productivity services that enable laboratories to improve operational efficiency. The Benchmarking Metrics Survey is a comprehensive data collection to compare performance of laboratories to document superior performance or to target improvement initiatives. The Laboratory Management Workshops provide an opportunity to learn how current management skills are applied to the laboratory and to exchange experiences with peers in major metropolitan areas around the U.S.

REES SCIENTIFIC

Laboratory Monitoring
Automated Watering Systems
Integrated Access Control

Feel confident and protected 24/7.

Our continually expanding line of monitors is matched only by our around the clock service and support team. Always expandable, dividable and network compatible, Rees systems provide you with alarm notification, programming flexibility, rich documentation and a host of other features. Rees systems are used by virtually every major pharmaceutical company worldwide and the Centron EMS has become the industry's standard in blood banks and similar facilities.

Now offering the following new products -

CentronSQL software

Wireless Sensors (Choose wireless, hard wired or both)

Automated Watering Systems

Security through Laboratory Monitoring

If you're planning a new facility or renovating an existing facility, please call us to arrange a brief demo.

REES SCIENTIFIC
AN ISO 9001:2000 COMPANY

1007 Whitehead Rd. Ext., Trenton, NJ 08638
800.327.3141 Fax: 609.530.1854
sales@reesscientific.com/www.reesscientific.com

Quat's Wrong?

FINDING THE CAUSE BEHIND DECREASED EFFICACY OF PREPARED QUATERNARY AMMONIUM SOLUTIONS

When used according to label directions, quaternary ammonium compounds (quats) are an effective means of eradicating microorganisms listed on the label. They are generally odorless, colorless, nonirritating, deodorizing, have some detergent action, and are good disinfectants.

The mode of action of quaternary ammonium products appears to be a denaturant and physically disrupts protein or lipid structures.[1]

Disinfection refers to the elimination of specific pathogens. The EPA requires that disinfectants must kill or render totally ineffective all of the microorganisms listed on a disinfectant product label. The EPA reviews all efficacy data and must approve it prior to product launch and assignment of the EPA registration number. Product labels must list the EPA registration number, the microorganisms that the product kills, safe use information, and the proper dilution for efficacy. It is imperative that the disinfectants are used in accordance with all label directions and recommendations to ensure that the product is performing acceptably.

In disinfection, efficacy is a critical measure. Efficacy is the ability to produce the desired results absolutely. When dealing with the quaternary ammonium products, the strength of the product is measured as proper dilution/parts per million (ppm).

WARNING SIGN

We first noted a potential problem when called to a facility to investigate a marked, rapid, and pronounced decrease in efficacy of prepared quaternary ammonium solutions. The facility was using paper toweling saturated with prepared quaternary ammonium[2] to sanitize their biological safety cabinets.

Each room in the facility had standard quat mixing stations.[3] These stations had been calibrated for appropriate delivery of the mixed product. The units were checked with a quaternary ammonium test kit[4] and verified for accurate dilutions. The mixed quaternary ammonium solution was then placed in lidded containers with paper toweling or paper wipes. The solution completely covered the stack of paper wipes and saturated them.

Though the solution from the mixing station was verified to be the correct strength, it was noted that the solution in the containers degraded rapidly — dropping from 800 ppm to less than 200 ppm within two minutes. There was a clear problem with the solution after it was put in the container.

ANALYSIS/FINDINGS

It is a common practice in many facilities to place paper towels or wipes in a container and soak the contents with a disinfecting solution. It is a time-saving step that puts the wipe and solution within easy reach. It appeared that the paper towels were a potential culprit. This looked even more likely when a dramatic drop in ppm was also duplicated with common, office supply store brand paper towels.

We proceeded to test various paper products against a standard, prepared quaternary ammonium solution in a controlled benchtop setting. We tested for ppm over time as well as changes in pH. The results demonstrated that the paper towel reduced the parts per million of the quat solution. Now that the problem had been identified, the question remained — what to look for in a paper wipe?

Telephone consultation with Kimberly Clark scientists confirmed that certain

Amy S. Ingraham and Tammy M. Fleischer

paper products (wipes, towels, etc.), when combined with quaternary ammonium solution, will inactive the quaternary ammonium solution swiftly.

REMEDY

From the results in the lab animal facility and at the bench, common paper toweling products may not be appropriate with quat solutions and may decrease efficacy. Facilities must verify that the wipes chosen for these tasks are compatible with the disinfectants used in-house. This can be easily accomplished by verifying the selection of a proper wipe when ordering from the supplier or by contacting the wipe manufacturer directly. Kimberly Clark recommended a product[5] that is suitable for use with quat solutions. When in doubt, facilities may also use quaternary ammonium test kits to check the quaternary ammonium dilutions.

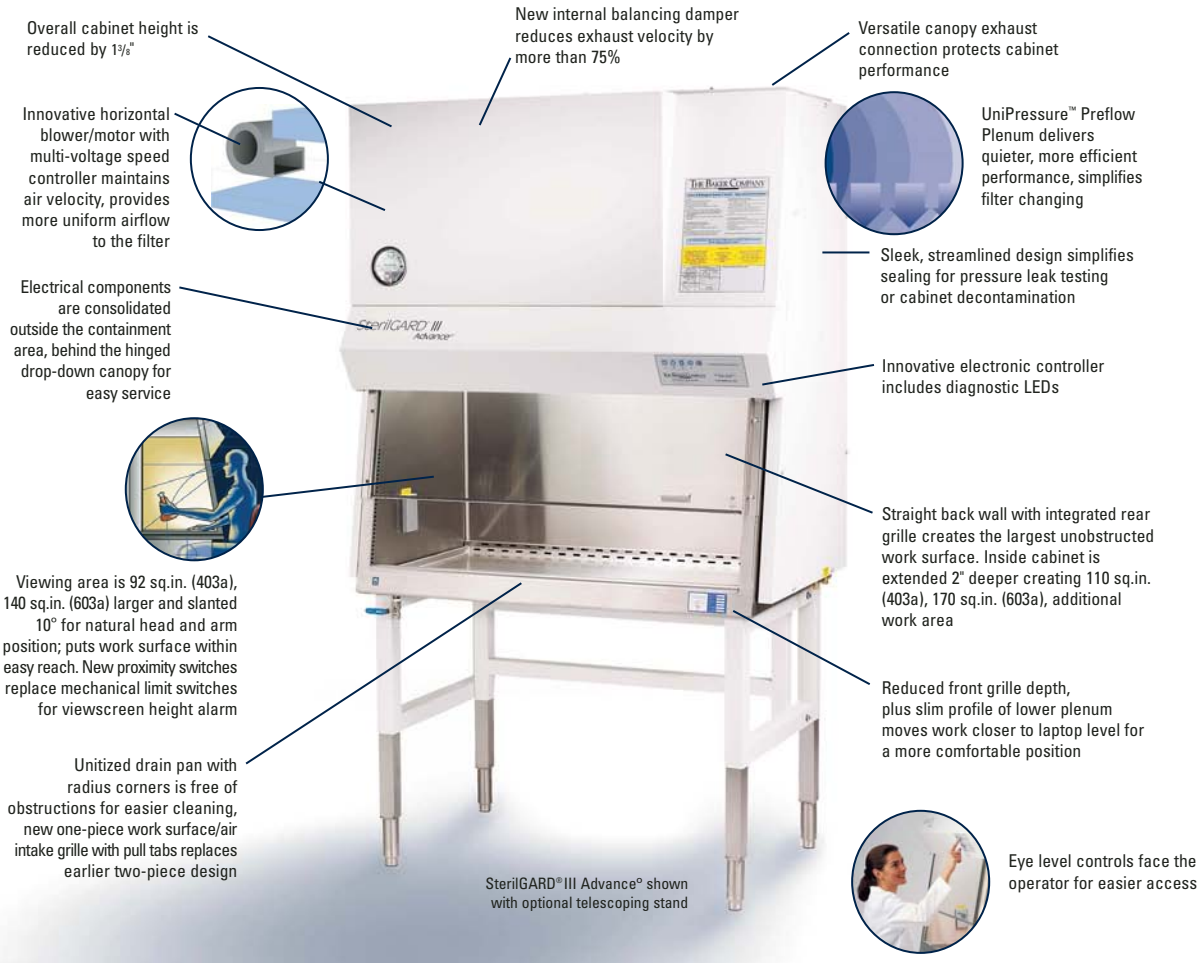
The authors gratefully acknowledge Jennifer Bidwell, a veterinary technician at West Virginia University Health Science Center for her assistance in the initial detection of this phenomenon.

1. Herbert N. Prince and Daniel L. Prince, "Viral Control and Transmission" in Disinfection, Sterilization and Preservation, 5th edition, ed. Seymour S. Block, Lippincott, Williams & Wilkins, 2000.
2. Quatricide™ PV, EPA Reg #47371-131-087, Pharmacal Research Laboratories, Naugatuck, CT.
3. Hydro™ 835, Pharmacal Research Laboratories, Naugatuck, CT.
4. QuatCheck™ 100, pHydrion Papers, MicroEssential Laboratory, Inc., Brooklyn, NY.
5. KimTech Prep Wipes® for Wet Task Systems (specifically the disposable #06211 unit).

Amy S. Ingraham *is Northeast Sales Representative, Pharmacal Research Laboratories.*

Tammy M. Fleischer *is a Buyer with Hubbard Hall.*

Do you have a troubleshooting case study for Lab Diagnosis? Please send a brief query stating the problem, the process, and the solution to editors@labmgr.com.



Just When You Thought The SterilGARD® III Advance° Couldn't Get Any Better,

We Came Up With Even More Improvements

The SterilGARD® III Advance° Class II, Type A2 biological safety cabinet is the platform for a complete line of Baker Company laboratory and animal research products.

SterilGARD® sets the industry standard for ergonomics, performance, ease of use and serviceability.

Sitting or standing at the 10° slanted front, you'll experience an interactive environment giving you more workspace than ever, putting controls within reach, minimizing glare, reducing fatigue, improving productivity.

New plenum technology offers quieter performance and extended HEPA filter life.

Contemporary controls include monitoring, communication and data management options for a variety of applications.

To learn more go to www.bakerco.com or call The Baker Company at 800-992-2537.

www.bakerco.com/advance

For a free Baker general catalog, visit us at www.bakerco.com/lm/offer or call 800-992-2537.

THE BAKER COMPANY

BIOLOGICAL SAFETY CABINETS • CLEAN BENCHES • LAMINAR FLOW EQUIPMENT • FUME HOODS
ANIMAL RESEARCH PRODUCTS • GLOVE BOXES • ISOLATORS • CUSTOM ENGINEERED PRODUCTS

P. O. Drawer E, Sanford, ME 04073 USA 207-324-8773 • Toll-Free 800-992-2537 • Fax 207-324-3869 • sales@bakerco.com

Careers in Science !

since 1984

EXECUTEC

Search Agency, Inc.

"Building Successful Teams in the Analytical/Biotech Instrument Industry"

Executec Search Agency, Inc. is the leading executive placement firm for the Analytical Instrument and Life Sciences marketplace. We specialize in the placement of the following positions on a GLOBAL basis:

- President/CEO/COO
- V.P. Sales/Marketing
- Sales/Sales Management
- Applications Scientist
- Field Service/Support
- Customer Support Manager
- R&D Management
- V.P. Operations/Engineering

Laboratory Managers and much more .....

Contact us for *high impact* players for your team!!

Mark Moyer
President
Mark@ExecutecSearch.com
702.892.8008

Chris Avron
Vice President Key Accounts
Chris@ExecutecSearch.com
702.892.8010

We work on both **Retained** and **Contingency** Searches.

No Fee to Candidates!

www.ExecutecSearch.com

PRYING a Raise During Tight-Fisted Times

Kevin Voigt
From CareerJournal.com

These are nervous times ... to be talking about your salary. The word "recession" is being used more frequently, more companies are announcing layoffs and staff safety is suddenly a major concern.

Yet you probably have been working more hours not fewer, and know your performance and results exceed what should be expected of you. Should you stay mum when raise time comes around? No, says Gregory Northcraft, professor of management at the University of Illinois. "Just like in the stock market, economic downturns present opportunities if you can figure out a way to make yourself part of the solution instead of part of the problem," he says.

Mr. Northcraft, co-author of the book "Get Paid What You're Worth: The Expert Negotiator's Guide to Salary and Compensation," (St. Martin's Press, 2000) offers these tips on how to ask for a raise in uncertain times.

WHAT'S THE BEST STRATEGY FOR ASKING FOR A RAISE RIGHT NOW WITHOUT YOUR BOSS KICKING YOU OUT OF HIS OR HER OFFICE?

When a company is laying people off, it may not be the best time (for salary negotiation), but there is no reason not to raise the topic. The key is to have a conversation with your boss.

Career-wise, it may be an excellent time to position yourself for a raise when the money becomes available again. You can ask for added responsibilities or a new job title. You're taking a risk, of course, that you may be doing more work in the short term for the same pay, but you've put yourself in a strong bargaining position down the line. After that, if they don't come through, then to be honest, I'd be looking for a new place to work.

If money isn't being handed out, you could ask instead for non-pay benefits, such as additional training or vacation time.

SHOULD YOU LOOK FOR A NEW JOB OFFER AS A WAY OF LEVERAGING A SALARY INCREASE?

If you want a raise — at any time — you need to present a convincing case that what you're already doing is worth more than you're already getting paid. Having an external job offer is an obvious way to build up your case: If someone else offers you more, that sounds like evidence that you should be getting paid more by your current employer. The danger is that if you use the offer as a threat, you need to be willing to carry through with it and take the new position. Otherwise, if it's an empty threat, you may wind up worse off because now your boss knows there is no reason to give you a raise because you aren't going to leave. A better strategy is to put together evidence showing why you already deserve a raise.

WHAT SORT OF EVIDENCE?

First, point out your job characteristics. Maybe you can marshal evidence that the characteristics of your job have changed. Maybe it has expanded; maybe you have taken on duties that were not part of your original job description. Or maybe similar jobs at your company have been reclassified into higher pay brackets and you can make a case that yours should be as well. The point you should try to make is that others are getting more pay for the same work, or that others are getting more pay even though you do more work.

Or second, you can argue performance-based merit. Tactfully find out what your colleagues are making. If everyone doing your job gets paid the same but you are the top performer, you deserve more pay. If you are performing just as well as people who are getting paid more, then you deserve more.

HOW DO YOU MAKE YOUR CASE TO YOUR EMPLOYER?

One of my executive students has a saying, "The person with the most information usually wins." If you present a convincing case, you can help the other side see you deserve what you want. Put together a comprehensive list of your duties and successes you've had with your work.

The best reason for your boss to give you a raise if you're a great employee is to keep you happy, productive and loyal to the company. That's in the best interests of everyone.

When you're talking to your boss, it's critical to keep the tone friendly. This should not be an accusation or a fight. It should be two colleagues working together to solve a problem — how to get you a raise. Keeping that in mind may help you maintain an even keel emotionally.

ANY OTHER STRATEGIES?

Perhaps the best long-term strategy is to put the ball in your boss's court. Ask the question, "What would it take for me to get a raise?" If your boss can explain what the rules are, you can tailor your ongoing behavior to qualify. If you use this strategy, don't be afraid to be clear about exactly what you want. There's no point in asking how to get a raise, doing what they say, and then finding out it's only a 2% raise. If you want 10%, then your question should be, "What do I need to do to get a 10% raise?" You might not get it today, but at least you'll know how to get it.

ALA
Association for Laboratory Automation

Call for Papers
LabAutomation2007

Dates to Remember:

Abstract Submissions:
September 11, 2006

Academic Grant Applications:
September 11, 2006

LabAutomation2007 is an interdisciplinary educational conference and exhibition where laboratory technologies emerge and merge through:

- Scientific focus on emerging technologies
- Knowledge sharing across diverse industries
- Over 100 educational presentations

Short Courses: January 27-28
Conference: January 28-31
Exhibition: January 28-30

Palm Springs Convention Center
Palm Springs, California

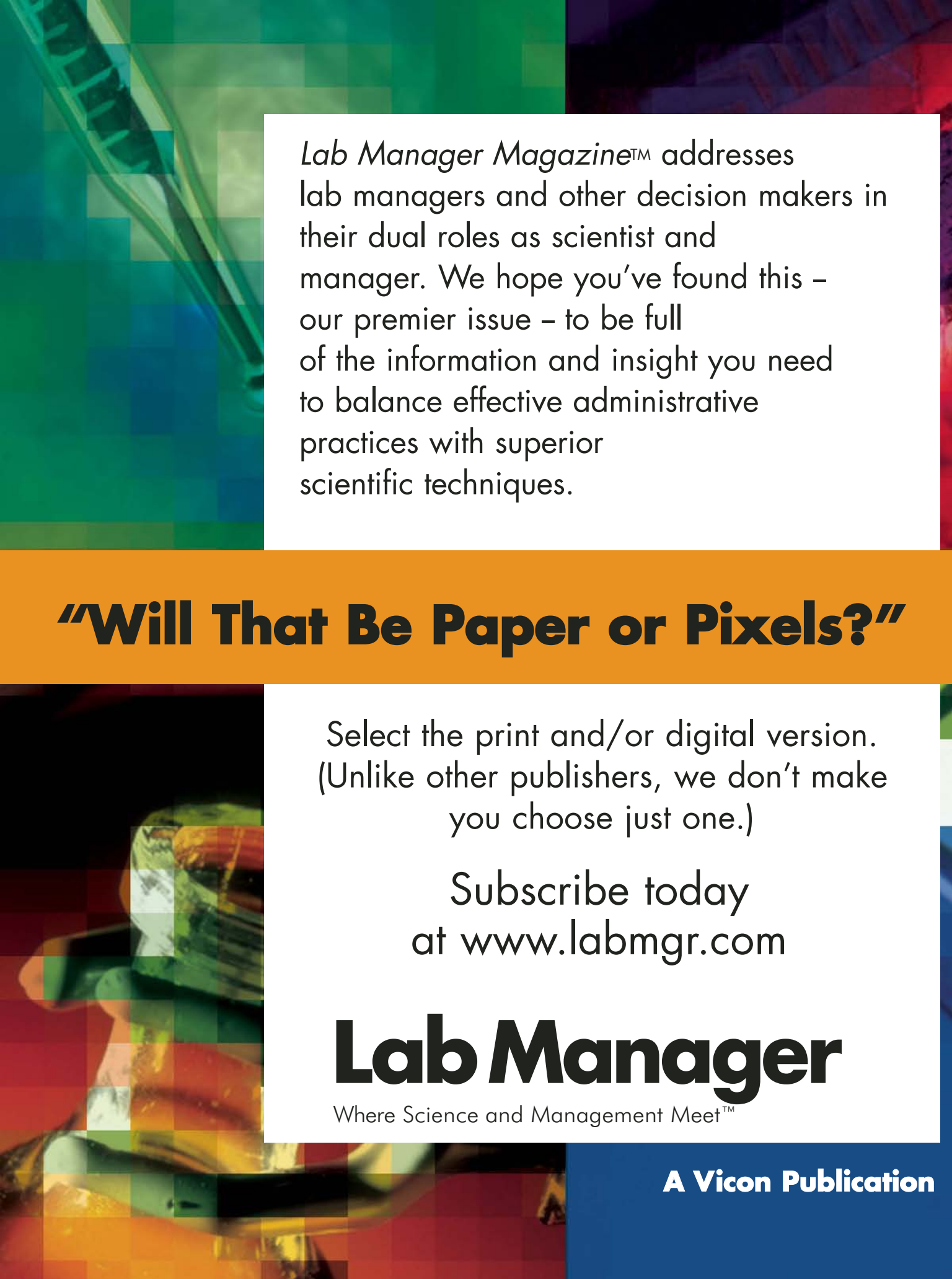
LabAutomation 2007

Where laboratory technologies emerge and merge

Submit Now!

Visit labautomation.org/LA/LA07 or call 888.733.1ALA (1252).

ALA is a non-profit association committed to driving progress in laboratory technologies through high-quality education that benefits the global scientific community, including its membership of scientists, academicians, and industry thought leaders.



Lab Manager Magazine™ addresses lab managers and other decision makers in their dual roles as scientist and manager. We hope you've found this – our premier issue – to be full of the information and insight you need to balance effective administrative practices with superior scientific techniques.

"Will That Be Paper or Pixels?"

Select the print and/or digital version. (Unlike other publishers, we don't make you choose just one.)

Subscribe today at www.labmgr.com

Lab Manager

Where Science and Management Meet™

A Vicon Publication

Susan Allan
Research Investigator
Millennium Pharmaceuticals, Inc.

WHILE HARVARD UNIVERSITY PRESIDENT LAWRENCE SUMMERS WAS IGNITING A CAMPUS FIRESTORM LAST YEAR BY PUBLICLY ENTERTAINING WHETHER MEN HAVE MORE "INNATE ABILITY" THAN WOMEN IN THE SCIENCES, RESEARCH INVESTIGATOR SUSAN ALLAN WAS A FEW MILES AWAY AT HER OFFICE, DOING HER BEST TO DISPROVE SUMMERS' HYPOTHESIS.

Allan does double-duty as a lab manager and researcher at Millennium in Cambridge, MA, a biopharmaceutical firm whose executive ranks are top-heavy with women.

She divides her time between research — performing target validation in Millennium's molecular and cellular oncology (MCO) lab — and managerial oversight of three departments: MCO, cancer pharmacology, and oncology biochemistry. Millennium, which targets cancer therapies, launched Velcade in 2003; the first FDA-approved proteasome inhibitor to treat multiple myeloma, a cancer of the blood.

Allan has a wealth of managerial experience. In 1985, she decided she wanted "something completely different" after being pink-slipped from a dental practice where she kept the books. Armed with an affinity for biology and an Associates degree in medical technology, she took a lab job washing glassware at Cold Spring Harbor Laboratory, a non-profit on Long Island, NY. "I fell in love with it when I went on my interview," said Allan. "It is also a very beautiful place."

As luck would have it, her workbench adjoined the lab occupied by Barbara McClintock, whose pioneering work in plant genetics — which pre-dated the discovery of the genetic code and the DNA double helix — won McClintock a 1983 Nobel Prize in Physiology or Medicine.

McClintock was a mentor and an inspiration. "I talked with her every day," said Allan. "She liked the fact I was trying something new. She was a big influence — an amazing person with such an incredible story.

"Barbara was one of the funniest and most honest people I have ever met. I could go to her with any problem; in fact, she encouraged it. She was so ahead of her time. I hope I play that mentor role."

After earning a degree in biology from night school and moving up to lab manager at Cold Spring Harbor, Allan decided to move from academe to industry, joining Millennium six years ago. "I'm very happy now," she said. "One thing I've always had in the back of my mind was going into the long end of this on the clinical side, being a liaison between patients and people running the trials."

"Academia was very intense," said Allan, "and spending was limited. And you were encouraged to talk openly about your research to others outside, but that sort of information is proprietary in industry, where it's intense in a different way, with many different departments working in unison, and prioritizing potential drug candidates."

Allan's managerial responsibilities include wringing out savings of time and money from the operations of about 75 laboratory personnel in the departments she oversees. "As always, communication is really important," she says. "The biggest obstacle in managing

F. Key Kidder

multiple research departments is keeping up with the needs of each group, and when you do make changes, communicating them can be difficult."

She relies heavily on inputs from two intermediaries from each department – who help determine, for instance, which high-use items to stock in centralized company depots at any given moment – and also learns from information exchanges at periodic company-wide lab council meetings.

"I don't have any particular management style. I like to laugh and learn," said Allan. "I feel that I know what needs doing. My job is to make things right and be pleasant to everyone, and to listen, and they're the same in return."

"It's challenging juggling my time between my management responsibilities and my workbench, where I spend a lot of time. Cancer research, as far as the drug industry is concerned, is all about personalized medicines."

Oncology target validation is a two-step process. In the discovery phase, research attempts to identify genes that deliver a "knockout" punch to an active tumor cell. The specificity phase tests to determine what, if any, impact the gene exerts on non-tumorogenic cells.

Allan's best day? "I have lots of them. I like my job, and I like the company. And my worst day, well, after putting in months of work, it stinks when an experiment doesn't work out. Sometimes you're just dead wrong, and you wind up with so many questions you have to answer – was the hypothesis wrong, did I forget a step in the protocol, did I use the wrong reagent? And to answer those questions, you have to repeat the whole experiment for each one. So the job has its ups and downs, but it's gratifying to think what it will mean if you can come up with a new drug."

Francis Key Kidder *started out as a journalist before moving on to politics and government relations, where he still keeps his hand in writing. He may be reached at 410-828-6529; info@labmgr.com.*


Technical references
Comparative product tables
Intuitive navigational features
Peel-n-stick tabs and Index tab
Thousands of new products
Fisher 2006/07
Fisher Scientific
Fisher Catalog 2006/07
Fisher Scientific
BETTER THAN EVER
The All-New 2006/07 Fisher Catalog
Redesigned to be more reader-friendly than ever before. Continuing a century-long tradition as a trusted resource, it's the book no lab should be without.
Got yours?
Get yours at www.fishersci.com or at 1.800.766.7000.
One Source, Infinite Solutions.
Fisher Scientific

managing workplace disagreements

John K. Borchardt, Ph.D.

Workplace disagreements - we all have them. The harder we work and the more we try to get done, the more likely we are to have disagreements with coworkers as our priorities conflict. Most are readily resolved in reasoned discussions in which both sides make compromises. However, occasionally more serious disagreements with coworkers can occur. These can often result in feelings of anger and resentment that can last for months. How can we minimize their occurrence and constructively manage them when they do occur?

This process begins by understanding your coworkers. A conflict resolution technique that works well with one may not work with another. Most of us are reasonable sorts and logical arguments and a sense of shared mission makes it possible to handle disagreements in a civilized way. However, it's important to remember that the most reasonable person may have a bad day and occasionally be difficult to deal with. Others are difficult to deal with much of the time. With them it's, "my way or the highway."

When trying to get a coworker's cooperation, certain tactics are generally useful whether or not that person is difficult to deal with. If you are trying to get the person's agreement to a course of action or participation in a project, describe the benefits that will accrue the other person. In the case of disagreements, identify areas where both of you do agree and build on these. Finally, ask a supervisor to adjudicate your differences only as a last resort.

Before beginning a discussion, you must have the other person's undivided attention. This means picking the right place and the right time for your discussion. Don't raise the subject when the person is distracted by the physical environment or another issue she is trying to resolve at the same time. If this happens when you go to see someone, quickly arrange a mutually convenient meeting place and time.

Disagreements in front others usually reflect negatively on all parties concerned. If you have a disagreement with one person, suggest a private meeting to resolve it. People often behave more aggressively when on their own "turf." So try to hold your one-on-one meetings with them on a neutral site rather than in their office. This is often preferable to holding the meeting in your office. Should the discussion get overheated and you begin to worry about losing your temper, it is easier to leave a conference room than your own office. The one exception to this is when you are the supervisor. Having the meeting in your office reminds the difficult person of your authority. This makes them more likely to moderate their behavior.

Turn the disagreement into a negotiation and look for ways both of you can benefit from an agreement. To begin the discussion, capture their attention by briefly explaining the benefit to them of what you are about to discuss. For example, say "Sue, if you help me with project X, together we can complete it on time. Your name will go on the report. We'll both look like heroes since the department will meet its goal of commercializing three new products this year." Alternatively, ask "If you do this for me, what can I do for you in return?" By answering the question, the difficult person has helped you defuse the situation and turn it from a confrontation into a negotiation.

SHOWING BENEFIT IS IMPORTANT EVEN WITH PLEASANT, COOPERATIVE COWORKERS.

Avoid becoming emotional in discussions with difficult coworkers. This includes obvious things like not becoming angry or defensive. It also means being aware of how your language could be construed by the other person. For example, in trying to understand their position, it is natural and effective to ask questions. However, consultant Len Leritz, author of *No-fault Negotiating* (Casa Pacifica Press, Portland, OR) recommends avoiding asking questions beginning with "why." These tend to be construed as attacking and can elicit emotional responses. Instead, ask questions beginning with "what." These questions result in more fact-based, less emotional responses. Compare "Why do you think that?" with "What are the reasons for thinking that?" The second question is less likely to draw an emotional response and the person's response could provide more information that will help you find areas of agreement to build on. Also, by leaving the personal pronoun "you" out of the second question, you reduce the emotional content of the question making it less threatening to the other person.

While you want to avoid becoming overly emotional during the disagreement or negotiation, show your satisfaction afterwards. Express pleasure in reaching a solution the two of you are happy with or at least can "live with." By helping your coworker share your sense of satisfaction and accomplishment (and maybe relief), you can make resolving your next disagreement easier.

***Dr. Borchardt is** a consultant and technical writer. The author of the book "Career Management for Scientists and Engineers," he writes often on career-related subjects. He can be reached at jkborchardt@hotmail.com.*

Safety System 3

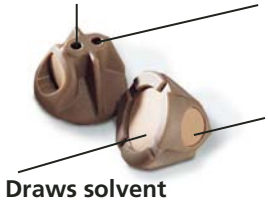
Eliminates the safety hazards of aluminum foil-wrapped solvent containers.

- The ULTRA-WARE® Economy Three Hole Cap is manufactured from PTFE with a TFE/propylene o-ring and a polypropylene screw collar. Three connecting threads on top of the cap use standard 1/4-28 flangeless fittings. Two ports have 1/8" through-holes for connection to the inlet / sparge filter. The third port has a 1/16" through-hole used as a vent port during sparging.
- The Solvent Bottle Adapter is made from PBT and converts ULTRA-WARE® GL-45 mobile phase caps to standard 4L solvent bottles for direct connection to your HPLC pump.

The Complete
Safety System 3
includes:

- ULTRA-WARE® Economy Three Hole Cap, GL-45
- Solvent Bottle Adapter, GL-45
- Combination Inlet / Sparge Filter, 2µm, PEEK™
- Flangeless Ferrules, ETFE, 1/8" (Optional - 2 Req'd)
- Flangeless Nuts, ETFE, 1/4-28 x 1/8" (2 Req'd)
- Vent Port Plug, ETFE, 1/4-28 (1 Req'd)
- Tubing, FEP TEFLON®, 1/8" OD x 1/16" ID x 10' in Length
- Kontes Article No. 953930-0000

Introductory Price Only **$149.99**



Unique Filter Combines Functions to Increase Efficiency

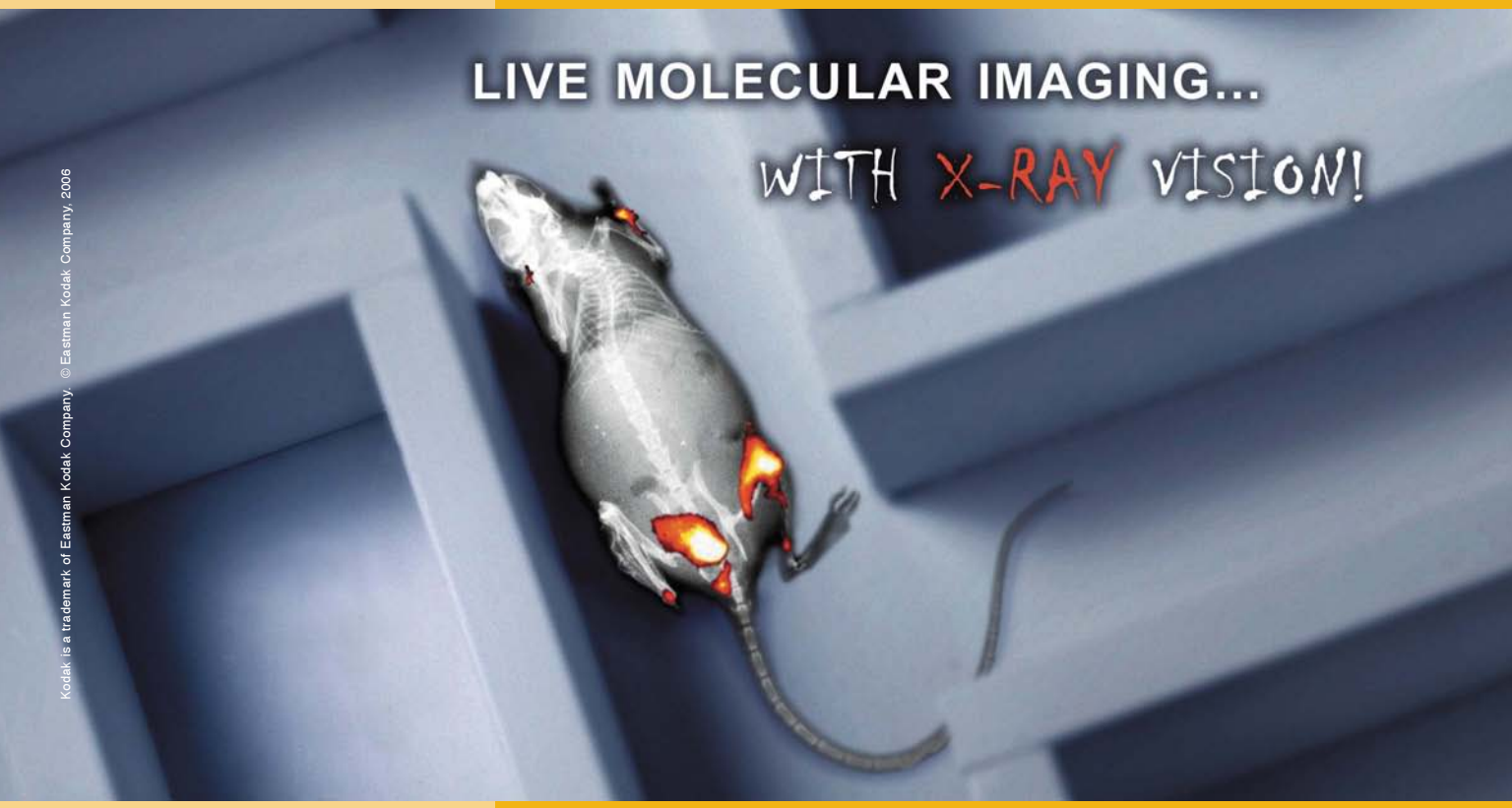
Included with your Safety System 3 is the unique **Bottom-of-the-Bottle™** Inlet / Sparge Filter. This component combines the functions of an inlet filter with a sparger in a single, convenient device. Sparging bubbles are prevented from entering the mobile phase stream while allowing the pump to draw all but a few milliliters of solvent from the reservoir or bottle. All PEEK construction makes it ideal for virtually all mobile phases. Supplied with 2µm porosity frits and connections for 1/8" O.D. tubing.

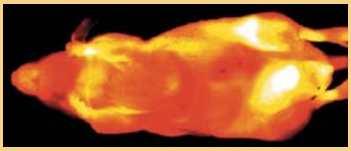
Bottom-of-the-Bottle TM Upchurch Scientific Inc., PEEK TM Victrex, TEFLON TM DuPont, ULTRA-WARE TM Kontes

KIMBLE® KONTES®
Call 888-546-2531
Fax 856-794-9762
info@kimkon.com
www.kimble-kontes.com

GERRESHEIMER glassPackaging

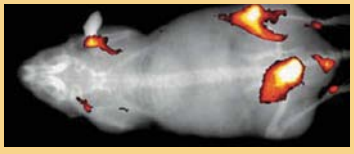
KK-0525R





Near-IR fluorescence image

Anatomical radiographic image



Co-registered images precisely locate molecular signals on anatomical background in live animals

Courtesy of Dr. K. Shi, C. Li, and J. Gelovani, MD Anderson Cancer Center

INTRODUCING **KODAK** IMAGE STATION IN-VIVO IMAGING SYSTEMS, WITH HIGH-SENSITIVITY OPTICAL MOLECULAR IMAGING AND HIGH-RESOLUTION DIGITAL RADIOGRAPHY CAPABILITIES IN A SINGLE MULTI-MODAL SYSTEM. Enhance the anatomical localization of biomarkers in small animals, organs, and tissues with precise co-registration of x-ray images with near-IR, isotopic, or luminescent optical imaging modalities—all without disturbing the sample. With true 16-bit imaging performance, 4 million pixel resolution, and a 10x optical zoom, the new Image Station In-Vivo Imaging Systems produce high-performance molecular imaging results for the widest range of labels and sample formats on an easy-to-use imaging platform. And everything is included, from an Animal Management Center for multi-modal imaging of up to four mice simultaneously, to KODAK Molecular Imaging Software for quantitative image analysis and multi-modal image overlay capability.

Wherever your research takes you, we've got the versatility and endurance to go the distance.

U.S. 1-877-747-4357, exp. code 7
O.U.S. +1-203-786-5657
www.kodak.com/go/imagestation1

MOLECULAR IMAGING SYSTEMS