

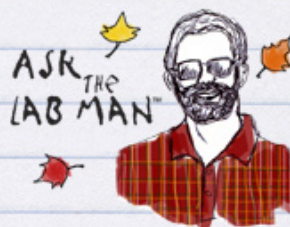


NOV 14 2006

A Fast Read on the Latest in Lab Automation

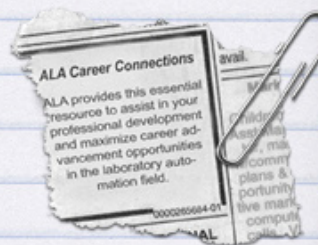
Enlightenment From The Lab Man

Laboratory automation development is being increasingly outsourced to the commercial market – this according to a recent ALA industrial member survey. [Go here](#) to get The Lab Man's insights and the actual results from this ALA survey on the state of industrial laboratory automation, and/or [download and listen](#) to his monthly Podcast.



Cross-Industry News

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ALA News

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U.S. Panel Wants Security Rules Applied to Genomes, Not Pathogens

Science (11/03/06) Vol. 314, No. 5800, P. 743; Bhattacharjee, Yudhijit

The U.S. government's attempt to prevent bioterrorist attacks is being threatened by swift advances in the synthesis of genomes, according to the National Science Advisory Board for Biosecurity (NSABB). The NSABB recommends that instead of regulating a list of known pathogens, the situation be rectified by regulating gene sequences that have the potential to be dangerous. Researchers have noted that biological agents can now be purposely engineered to function like pathogenic microbes, but these agents nonetheless exist outside the bounds of current regulations, which "apply only to biological entities whose nucleic acid sequences are identical to those of agents listed by the government," says Stanford microbiologist David Relman. Biosecurity expert Gigi Kwik Gronvall of the University of Pittsburgh says that a regulatory framework that provides clear definitions of what is permissible and what is not is needed, not a framework based on the properties of gene sequences. The NSABB is recommending that the government create a "framework based on predicted features and properties encoded by nucleic acids."

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Software to Improve Efficiency of Medical Research

Arizona State University (11/02/06) Emeneker, Kelley

Computer science, information management, medical research methods, and clinical practice have been brought together by a new computer application that is able to analyze vast amounts of biomedical data in order to find and extract information needed for research efforts. Over 1,000 articles and research papers are published in the field of biomedicine everyday, so keeping up to date with the latest finding is almost impossible, according to Chitta Baral, a professor in ASU's Department of Computer Science and Engineering, and an affiliate faculty member with the Department of Biomedical Informatics. Collaborative Bio Curation, or CBioC, is able to search not only by term but by higher-level concepts, such as "genes related to brain cancer," unlike Google. Baral explains that CBioC will save researchers time and effort spent looking through hundreds of thousands of articles to find information that applies to their area of study. CBioC runs within PubMed, the primary repository of biomedical papers maintained by the National Library of Medicine, extracting and displaying facts reported in a given article, and allowing users to search for similar facts in other articles. Researchers are able to vote and share comments on the accuracy of the facts that have been extracted. Consensus reached among researchers allows information to be updated, assuring the highest level of correctness possible.

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Robotic Arm Pulls Worker to His Death

Detroit News (11/01/06) P. 3B; Martindale, Mike

A 46-year-old manager at a Michigan industrial plant was crushed to death on Oct. 31 when a robotic arm he was cleaning turned on and pulled him into a press machine. The Michigan Occupational Safety and Health Administration (MIOSHA) is investigating the fatality, which occurred at HydroDynamic Technologies. The company, which employs 22 workers, makes auto parts, among other things. A company representative declined comment about the death of manager Steven McGirr, who was said to have experience with the equipment, although he was not the regular operator of the machinery. MIOSHA safety and health manager Eva Hatt said that the state has no records of problems at HydroDynamic and that there is nothing to indicate that the company was negligent in McGirr's death. Fatalities involving robots are rare, Hatt said. "Most of our entries this year have involved tree-trimming and power industrial trucks," said Hatt.

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A Miracle? It's Water Out of Air

Investor's Business Daily (10/30/06) P. A8; Bonasia, J.

Two months ago, Florida's Federal Emergency Management Agency (FEMA) purchased a pair of 40-foot trailers that are each capable of harvesting 2,500 gallons of water from the atmosphere per day. The state's FEMA staff decided that the trailers could be immensely helpful when water supplies are needed during hurricanes or other disasters. The trailers use a patented technology that wrings water molecules out of the air via a hygroscopic natural salt-based solution. The water-harvesting technology was created by privately held Miami-based Aqua Sciences. The technology uses a salt solution to extract water from the air, similar to how salt in a salt shaker tends to absorb moisture on humid days. As an added benefit, salt is a natural decontaminant, keeping the extracted water clean. In contrast to desalination or filtration systems, the Aqua Sciences technology extracts clean new water from air.

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Nanotube Computing Breakthrough

Technology Review (10/30/06) Bullis, Kevin

A major hurdle to the development of ultrafast computers that use carbon nanotubes has been overcome. Researchers at Northwestern University have found a way to take material that contains batches of nanotubes and segregate the nanotubes into groups having the exact specifications needed for high-performance electronics. While computers that utilize nanotubes are still many years away, high-definition displays, solar cells, and devices for nanotoxicity testing are among short-term applications for the technology. Using this new technique, nanotubes are separated by metallic or semiconducting properties, and by diameter. Sorting by diameter was expected by the researchers, but the ability to sort by electronic type surprised them. Techniques used to accomplish these distinctions and create logic circuits from carbon nanotubes are "all pretty tedious," according to Mildred Dresselhaus, professor of physics and electrical engineering at MIT. It is not yet possible to increase the scale of production to manufacture chips with millions of transistors to compete with present computers. The breakthrough occurred when surfactants were added to a batch of nanotubes and were found to assemble in different concentrations, creating density differences that could be measured. Densities could then be sorted out using ultra-centrifugation. Andrew Rinzler, professor of physics at the University of Florida at Gainesville, says this method has produced "the best data I've seen so far," resulting in batches that are sufficiently pure for high-performance applications. The ultra-centrifugation process could theoretically be scaled up for industrial production, says Mark Hersham, materials-science and engineering professor and one of the Northwestern researchers. Hersham claims to have developed transistors using thin-film meshes of semiconducting nanotubes, the type that could be used in controlling pixels in flat screen TVs.

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Industrial Design Takes Cue from Bugs, Leaves, Crabs

CNet (10/27/06) Olsen, Stefanie

An emerging field of research and development called "biomimicry" refers to seeking out designs in nature that can be replicated in manmade objects for greater efficiency. Examples include a Mercedes-Benz that resembles a tropical boxfish, a building in Zimbabwe whose ventilation is inspired by a termite mound, and a PC fan resembling a seashell. A leading expert in this field is Janine Benyus, head of the Biomimicry Institute and author of a book on the subject. Speaking recently at the University of California, Berkeley's Haas Business School, Benyus described how microbumps on the lotus leaf that enable rainwater to efficiently eliminate dirt from its surface have inspired new facade paints and furniture fibers designed to be easy to clean. Other examples of biomimicry are adhesives based on gecko feet and a mining search-and-rescue robot inspired by the ghost crab. Leaves' efficiency at photosynthesis, meanwhile, has been an important inspiration for solar cells, and Biopower Systems has a sea-wave energy harvester that was prompted by the study of tuna and kelp. Biomimicry has also been an important new research area at universities like MIT and the University of New Mexico; Berkeley itself recently set up a Center for Interdisciplinary Bioinspiration

in Education and Research, or Ciber, to tap into the biomimicry trend. Scientists at Berkeley are looking at the jewel beetle's method for deciding where to lay its eggs as they work to create a highly sensitive infrared sensor.

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Blood-Clotting Model

Chemical & Engineering News (10/23/06) Vol. 84, No. 43, P. 15; Arnaud, Celia

Using microfluidic devices, researchers at the University of Chicago have devised a model to mimic the highly complicated system of hemostasis—an accomplishment that Brandeis University's Irving Epstein describes as a "tour de force." According to the study's leader, chemistry professor Rustem F. Ismagilov, "The clotting network is just too complex to model the reactions and transport and get some sort of intuitive understanding." The researchers broke the network of about 80 reactions down to three modules, demonstrating autocatalytic production of clotting activators, depletion of the activators by diffusion, and formation of a clot at high concentrations of activators. The model makes use of patches containing clotting activators, generated on the surface of the microfluidic channels. The Chicago researchers were able to predict the threshold patch size below which clotting should not take place. In his commentary, Epstein said that the model "significantly extends the scope of chemical reactions as a source of fruitful models for complex biological processes." The Chicago researchers' paper and Epstein's commentary can be found in Proceedings of the National Academy of Sciences.

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Organon Invests in Automation Platforms in Drug Discovery Laboratories

Medical Devices & Surgical Technology Week (10/22/06) P. 192

Automating the drug discovery process from in vitro testing through optimization-related testing of promising compounds will help improve productivity at Organon research sites. Organon has rolled out robotic systems at its Oss research laboratory in the Netherlands, as well as its facility in Newhouse, Scotland. The 8 million euro investment consists of technology from Beckman Coulter, Biomek Liquid Handlers, and new SAMI EX software to control transportation robots. Automating downstream hit optimization and lead optimization screening in such a manner will also make the drug discovery process more cost effective for Organon. The new systems replace high-throughput screening facilities Organon used for in vitro screen testing of compounds, and as a result of their implementation, the research labs no longer have to carry out hit optimization and lead optimization separately. The investment in the new systems comes at a time when Organon is also investing in a new automated compound store for its compound library in Newhouse.

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Scanners for Liquid Bombs in Works

USA Today (10/18/06) P. A1; Frank, Thomas

A new breed of three-dimensional X-ray machines capable of detecting liquid explosives represents the future of screening carry-on baggage at U.S. airports. The only question for the Transportation Security Administration (TSA) is whether it should begin purchasing the machines now at a cost of up to \$200,000 apiece or wait a couple of years and purchase a significantly enhanced version of the machines at \$400,000 apiece. The TSA originally intended to wait and purchase the enhanced version but TSA chief Kip Hawley says it may make sense from a security standpoint to begin purchasing the currently available 3-D machines. The devices, known as multi-view X-ray machines, scan bags from multiple angles, creating 3-D images of the bag's contents. The X-ray machines currently used at airports create images that make it more difficult to differentiate weapons from common items. The 3-D machines have "an extraordinary ability to find" liquids, says Hawley, and a government report indicates that the machines could "significantly increase" security screeners' ability to detect weapons. Furthermore, industry experts say that the 3-D machines should reduce the need for manual baggage searches, thereby speeding up airport security lines.

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Scientists Use Grammar Rules to Slay Killer Germs

CNN (10/18/06)

Researchers have been drawing on the lessons of grammar and linguistics to find a better way to deal with bacteria that evolve to become resistant to natural drugs. Scientists use letters to represent the amino acids in peptides, and these strings of letters have turned out to resemble meaningful language. "You have a string of letters and that string of letters reminds you immediately of a sentence, a kind of incomprehensible sentence, and you wonder in that sentence, 'Is that meaning hidden?' says MIT chemical engineering professor Gregory Stephanopoulos. Stephanopoulos gives an example of a simple sentence—"Dave asks a question"—and says that a peptide represented that way can often still defeat the bacteria when other "names" are substituted for "Dave." A paper in Nature magazine describes how scientists have used these insights to create 40 artificial substances designed to fight bacteria including anthrax.

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A Database for Disease

Technology Review (10/13/06) Wu, Corinna

A new public database called the Connectivity Map will help researchers discover new uses for drugs in the treatment of diseases by analyzing gene-expression signatures. The database uses the signatures left by different drugs to match drug compounds with the processes occurring within diseased cells. In a recent study published in Science, researchers analyzed the effects had by 164 biologically active molecules, including Food and Drug Administration-approved drugs, on four kinds of cancer cells using DNA microarrays supplied by Affymetrix. Although it was only a small study, researchers have already found two potential matches, according to Cancer Cell. The scientists learned that the plant-derivative gedunin may interfere with the hormone androgen present in prostate cancer cells, and also found that the drug sirolimus may re-sensitize chemotherapy-resistant leukemia cells to the treatment. Researchers hope to include the roughly 1,400 drugs currently approved by the FDA in the next couple of years. "We wanted to make data that was broadly useful, so that requires a systematic approach to data generation," said Justin Lamb, senior scientist at the Broad Institute in Cambridge, Mass. "And then if you can make that database accessible to the world in a way which is easy for the world to interact with it, that would solve a lot of problems for a lot of people."

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Hard Work Worth It for 'Paperless' Labs, Experts Say

PharmaDevice IT Report (10/11/06) Vol. 6, No. 20,

A laboratory automation system can do more than help Food and Drug Administration-regulated companies with 21 CFR Part 11 compliance efforts. In early October, George Kuniholm, regional director at CSSC, a regulatory compliance service provider, said a "paperless" lab will boost e-data visibility, while improving indexing and retrieval of files. "Overall the benefits definitely outweigh the costs," said Kuniholm. A couple of days later, Victoria Lander, corporate compliance manager for Waters Corp., joined Kuniholm at a CSSC seminar in Cambridge, Mass., in warning FDA-regulated companies that paper-based systems are no guarantee that lab processes are under control. The two cited increased data security, improved availability and capacity of lab equipment, remote access to lab data, better analysis of data collected on various equipment, e-lab notebooks with e-signature approvals and reduced review cycles, automated input of data into reports and reports into submissions, and enhanced data retrieval for audits as goals for a laboratory automation system. Companies should take a phased approach to embarking on a laboratory automation system, and they should consider where the data will reside, how other systems and users will access the data, as well as the different input standards and entry formats. Risk assessment, a study of the costs and benefits, and long-term use should be priorities as companies look to transition to a paperless lab.

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FDA Told to Watch Nanotech Products for Risks

Reuters (10/11/06) Richwine, Lisa

At a recent hearing called by the Food and Drug Administration (FDA), consumer and environmental groups urged the agency to beef up regulation of products made with nanotechnology, noting that nano-sized materials may affect the human body and overall environment differently than larger particles. Products already regulated by the FDA are treated the same whether or not they are made with nanotechnology. However, these groups are concerned about cosmetics, foods, vitamins, and other unregulated products, as those containing nanoparticles have already hit the market. The agency has established an internal nanotechnology task force, but Martin Philbert of the University of Michigan School of Public Health cautions against over-regulation.

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Researchers Develop Cheaper Food Safety Techniques

FoodProductionDaily.com (10/09/06) El Amin, Ahmed

Researchers herald two technologies aimed at detecting and killing pathogens found on produce, fruit, and other products, including one that uses a laser and another that relies on chlorine dioxide. The methods were developed by researchers at Purdue University, and patents are pending on the technologies, which are likely to be sold under licensing agreements. With the outbreak of E. coli among spinach products, food processors and others are seeking more efficient safety tools. The laser technology will be used to detect problems before produce is sent out into retail markets, while the chlorine dioxide is to be used to disinfect the products. The laser technology works on bacteria colonies in petri dishes, and then a computer program determines what type of bacteria it is based upon how light is refracted by it. The chlorine dioxide gas is not only applied to produce but could also be applied to processing equipment, but researchers are still working out what the proper amount of gas should be when disinfecting produce given that too much gas can reduce the quality of the fruits and vegetables.

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The Promise of Molecular Imprinting

Scientific American (10/06) Vol. 295, No. 4, P. 87; Mosbach, Klaus

Nanometer-scale plastic “fishing nets” developed more than 30 years ago by researchers at Sweden’s Lund University demonstrated the ability to trap living cells and biological molecules that could still do their usual tasks for months outside of living organisms. Since then, writes the leader of that research, Klaus Mosbach, this technique has been put to work doing many things—for example, producing aspartic acid using plastic nets containing *E. coli* cells, or converting glucose into fructose using plastic embedded with a particular enzyme. Mosbach’s next idea was to modify the technology to enable the nets to mold themselves around the molecules, which would then be flushed from the nets and leave their molecular imprints behind to capture other molecules of the same type. According to Mosbach, the appealing features of these molecularly imprinted polymers (MIPs) include their low cost of production and their ability to be stable for a long time even when the conditions are extreme. Their ability to isolate specific types of molecules could potentially be used for various applications, such as removing unwanted substances from blood and perhaps reduce the frequency of needed hemodialysis, for example. In addition to applications that exploit MIPs’ ability to capture specific molecules or microorganisms, there are other potential applications that would involve molding the plastic to mimic portions or all of a natural molecule such as an antibody. Areas of future research include double imprinting—which could produce drugs mimicking the three-dimensional structure of existing drugs but also improving on them in various ways—and direct molding, which could block molecules from performing undesired actions. Companies currently making use of MIPs are Aspira Biosystems, MIP-Globe, MIP Solutions, MIP Technologies, POLYIntell, and Semorex.

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Biosensors

BioTechniques (10/06) Vol. 41, No. 4, P. 379; Lederman, Lynne

Numerous research studies are underway to develop biosensors, which detect biological and chemical molecules via biomolecular probes. Biosensors could be used to identify contaminants in food and water supplies; detect viruses; or determine whether people, freight, or vehicles are carrying drugs, bioterror agents, or explosives. They can handle samples of various sizes—ranging from bodies of water to a drop of blood—and are portable. Microfluidic biosensors that target RNA are being developed by Cornell University associate biological and environmental engineering professor Antj Baeumner. Baeumner’s team has created electroflow assays for all four serotypes of Dengue virus and is presently working on systems that detect Gram positive and negative bacteria and protozoans. Meanwhile, Boston College chemistry professor Shana Kelley is developing electrochemical biosensors that use nanostructures, and University of California-Irvine chemistry and biomedical engineering professor Robert Corn is concentrating on the detection of bioaffinity interactions via surface plasmon resonance.

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