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INSTRUMENT BUSINESS OUTLOOK

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Society for Neuroscience Conference Showcases Emerging Technologies

The annual meeting of the Society for Neuroscience took place in San Diego, California, this year from November 12 to November 16. The last time the conference had been held in the city was 2013. The meeting is the largest gathering of neuroscientists worldwide with an estimated attendance of over 30,000 participants. Consequently, it is an important show for numerous analytical techniques, including super-resolution microscopy.

On Monday night, a presentation and panel discussion centered on the US's BRAIN (Brain Research Through Advancing Innovative Neurotechnologies) Initiative (see ***IBO*** 4/15/13, 6/15/14). Launched in 2013, the BRAIN Initiative is a US public-private partnership to accelerate technology and application development for the study of

the human brain. For FY17, the US presidential budget for the Project is $450 million. Run by the NIH, federal agencies involved in the Project are the DOE, DARPA (Defense Advanced Research Projects Agency), the NSF, IARPA (Intelligence Advanced Research Projects Activity) and the FDA.

The discussion looked at the history of the Initiative, currently funded projects and the future of neuroscience research in general. Chris Martin, PhD, of the Kavli Foundation, a private sector supporter of the BRAIN Initiative, announced the launch of BRAIN Initiative Alliance webpage (http://www.braininitiative.org/) to serve as a centralized information location for both the public and researchers for information regarding the BRAIN Project and similar projects worldwide. The site also includes a listing of grant opportunities.

Four researchers presented the results of research funded by BRAIN Initiative grants, highlighting the emphasis of the project on technology development and application. Among the techniques highlighted by the scientists discussing their research funded by the BRAIN Initiative was the use of single-cell RNA-Seq to characterize cell types in the brain; optogenetics to study dexterous behavior in mouse models; a human-wearable PET scanner, which allows for full head motion; and the mapping of the human neocortex using massively parallel single-cell analysis.

In the subsequent group discussion, Walter Koroshetz, MD, director of the NIH's National Institute of Neurological Disorders and Stroke, noted that future investments by the BRAIN Initiative will emphasize technologies for working with non-model organisms. William Newsome, PhD, of Stanford University discussed the importance of theoretical approaches and statistics to understanding large data sets. Jim Deshler, PhD, deputy division director of the NSF's Directorate for Biological Sciences/Division of Biological Infrastructure, told the audience that the NSF is working to coordinate the BRAIN Initiative with brain research worldwide such as the EU's Brain Project (see ***IBO*** 1/31/13). Reflecting on lessons learned from other fields, the panel discussed the need for team (versus individual) science. Dr. Koroshetz noted the NIH is trying to advocate for such an approach.

As for the exhibit, venture-backed start-up Ultivue, whose original patents were licensed from the Wyss Institute at Harvard University and Caltech, was at the show, presenting its first commercial product, the Ultivue-2 kit for super resolution microscopy. The Ultivue-2 kit is based on the DNA-PAINT (Point Accumulation for Imaging in Nanoscale Topography) technology for single-molecule localization. DNA-PAINT utilizes short complementary DNA strands, one attached to an antibody and its complement to a fluorophore. Transient hybridization of these short strands in combination with optical sectioning (i.e., TIRF, SPIM illumination) allows for the "blinking" characteristic of single-molecule localization techniques. However, in contrast to the use of dye-labeled antibodies, the transient bond allows for single-channel imaging of multiple colors sequentially using the same dye and immunity to photobleaching. Demonstrated resolution is as low as 20 nm in cells.

The technology also alleviates pain points in super resolution by requiring lower laser power, and less strenuous sample and buffer preparation. Launched this summer, the Ultivue-2 is a two-plex secondary antibody-based kit for an average of 25 two-color experiments in super resolution. It is priced at $750 and available from Ultivue's website. In addition, the DNA strands can be lengthened to accommodate stable binding and dehybridized at any time with a proprietary buffer, allowing for high multiplexing at standard resolution microscopy in cell and tissue samples. Ultivue also showcased its first secondary antibody-based kit, available for early adopters under a material transfer agreement, which enables imaging of up to five colors in cells, including the DAPI fluorescent stain.

Super resolution microscopy was definitely a theme at the show, as all major vendors were represented. At the show, Nikon Instruments launched the ECLIPSE T*i*2 Inverted Research Microscope. The system features a 25 mm field of view (fov), compared to 18 mm on the ECLIPSE Ti. The larger fov allows the system to take greater advantage of large-format CMOS cameras. Consequently, the system enables higher data throughput. High throughput is also enabled by hardware-triggering, in which the camera exposure signal triggers the activity of other devices instead of the software processing.

Also emphasizing speed was ZEISS with its new Airy Scan Fast confocal laser scanning microscopy system. Based on a new illumination shaping approach, the system features an increased speed of 20–50 frames per second and improved signal of noise, compared to the Airy Scan. The company claims a four-times increase in acquisition speed.

At the show, Bruker launched the Ultima NeuraLight 3D module for its Ultima Multiphoton Microscopes, designed for optogenetic applications. Optogenetics is the control of neurons through light by targeting specific proteins. The Ultima NeuraLight 3D combines 3-D optical stimulation and multiphoton imaging, resulting in a 3-D laser hologram based on multiple stimulation points. Special software allows for fast switching times (300–500 Hz) to capture 3-D

activation patterns.

Next year's conference will be held November 11–15 in Washington, DC.

LGC Buys Two Companies

Teddington, UK 11/18/15; Teddington, UK 11/24/16; London, UK 11/24/16—Life sciences and measurement firm LGC has acquired two companies, adding to its Standards and Genomics divisions. On November 24, LGC announced the purchase of BRC Global Standards, a provider of safety and quality standards programs for food and non-food manufacturing, packaging, storage and distribution. British Retail Consortium, a trade association for the UK retail industry and BRC's previous owner, retains a minority stake. "BRC Global Standards is a globally recognized and respected brand and its capabilities are highly complementary to LGC's existing strengths across reference standards, proficiency testing and sports supplements supply chain assurance," stated Euan O'Sullivan, managing director of LGC's Standards Division. The companies stated that the purchase is part of BRC's transition from a standards owner to a brand and consumer protection organization.

LGC also announced the purchase of Prime Synthesis for an undisclosed amount. Prime Synthesis produces Controlled Pore Glass (CPG) supports for oligonucleotide synthesis. The acquisition adds to LGC Biosearch's CPG business, which will now include a US manufacturing location, and enables scale up of CPG production for pharmaceutical customers for late-stage clinical trials for oligonucleotide therapeutic candidates. "We are delighted to be integrating PSI to our Genomics division," commented Daren Dick, vice president and general manager of LGC Biosearch's Genomics division. "The acquisition will enable us to provide customers across the world with an extended products line, and strengthen our supply of oligo synthesis materials."

The BRC purchase broadens LGC's reference materials and proficiency testing business to new markets and products, such as offerings for the supply chain, as well as certification. In addition, the acquisition expands its share of customers in the food safety and consumer products testing markets. BRC will form a new business unit within LGC's Standards division. As for Prime Synthesis, a revival in the development of oligo therapeutics has raised forecasts for commercialization. As a supplier of lab-scale CPGs, LGC can now expand this business to serve the market for scale-up of therapeutic products.

QIAGEN to Relaunch GeneReader in the US

Charlotte, North Carolina, and Hilden, Germany 11/9/16—QIAGEN announced that it will relaunch its GeneReader NGS System in the US after its removal from the market in September due to a preliminary injunction (see ***IBO*** 9/15/16). To be released in early 2017, the relaunched GeneReader uses new sequencing chemistry. The chemistry will be available to early-access customers starting in December. "We remain convinced of our intellectual property positions on our legacy GeneReader chemistry," commented QIAGEN CEO Peer M. Schatz. "That said, we are very proud to be able to today unveil a completely new and different chemistry with even further enhanced sequencing performance characteristics. QIAGEN's fast reaction to the preliminary restriction of customers' access to a superior Sample to Insight solution is a testament to the depth and breadth of our technology and intellectual property portfolio." QIAGEN stated the relaunch was due to accelerated upgrade programs.

QIAGEN announced this month during its Analyst & Investor Day that it expects 55–60 account placements of the GeneReader this year. The company also announced that it will release its Actionable Insight Tumor Panel with the new chemistry in 2017. Future plans for the GeneReader system include BRCA testing as well as customized content development.

Brooks Buys BioCision Businesses as New Company Is Formed

Chelmsford, MA 11/29/16; San Rafael, CA 11/29/16—Automation and cryogenic solutions provider Brooks Automation has acquired Cool Lab, a subsidiary of R&D firm BioCision, for $5 million in cash and non-cash consideration up to $9 million. Cool Lab supplies applications for cooling and freezing samples, controlled-rate freezing, portable cryogenic transport, and archival storage solutions for temperature-sensitive workflows. Cool Lab's 12-month revenue totaled $5 million. Brooks held an equity interest in the company and supported the company with convertible debt and term note financing (see ***IBO*** 4/30/14). The companies codeveloped the CryoPod for portable cryogenic transport. "This acquisition is a successful outcome from our long partnership with BioCision," noted Dusty Tenney, president of Brooks Life Science Systems. "The product line extends our range of comprehensive sample management solutions that provide sample integrity, quality and utility across the cold chain of custody for our customers." The non-cash consideration includes Brooks' repurchase of its equity ownership and cancellation of the convertible debt securities, term notes and related interest receivables.

The product lines acquired by Brooks include the CryoPod mobile carrier, CoolBox ice-free sample preparation systems and CoolCell cell cryopreservation systems, which were BioCision's primary product lines. Corning Life Sciences currently distributes Cool Lab products globally, excluding the CryoPod, and will continue to do so.

On the same day, BioCision announced the launch of MedCision, a new company focused on automation for preclinical and clinical processes, including point-of-care settings. MedCision's initial product will be BioCision's ThawSTAR cell thawing platform. "MedCision will be a leader in developing and commercializing innovative instruments for crucial processes in the post-manufacturing cell and gene therapy space," commented BioCision CEO Rolf O. Ehrhardt, MD, PhD. Dr. Ehrhardt will serve as president and CEO of the new company, along with former senior management of BioCision.

MedCision will have less than 20 employees and will be focused on B2B sales. Dr. Ehrhardt told ***IBO****, "The division was a very easy one. BioCision, under the Brooks leadership, continues to serve the research market with primary passive tools and devices. MedCision will serve the clinical and medical markets, with mostly active software algorithm-driven devices and instruments". Describing the company's ThawSTAR dry-based automated thawing system (see* ***IBO*** *8/15/15), he said, "The ThawSTAR is definitely the main focus, and it has implications not just in cell therapy thawing but also in vaccine thawing, and even in preclinical settings. We are going to announce in the next few weeks a few partnerships, including cell therapy companies and vaccine manufacturers." He said that many experts believe thawing is the most critical step post manufacturing for cell therapy. Current water-based thawing systems can introduce variability and raise contamination concerns.*

The primary applications settings for the ThawSTAR will be point-of-care settings and pharmacies, following shipment of frozen samples. Automation and standardization will be especially critical for cell therapy, according to Dr. Ehrhardt. "This is the first drug product that is going to be relatively nonstable… it is a live drug product," he said. "The idea right now is to automate as much as possible to get a reproducible drug."

Correction

In the November 15 issue of ***IBO***, the article entitled "M&A Flurry Amidst Rising Valuations," PerkinElmer was incorrectly identified as having sold its NIPT screening lab services business. The first part of the sentence should have read: "Interestingly, such divestments included two testing services businesses: PerkinElmer's US prenatal screening laboratory services business (see ***IBO*** 4/30/16)".

The Life Science Industry Awards

The seventh Life Science Industry Awards (LSIAs) were presented August 15th in San Diego, California, at a gala at the Hilton Bayfront. Presented by research and advisory firm BioInformatics LLC, the LSIAs recognize life sciences tool companies for their outstanding performance in 13 categories, including new products, best technical support and best website. The LSIAs are devoted to customers' recognition of their life science suppliers and products.

2016 Life Science Industry Award Winners	
2016 Life Science Industry Award Winners	**Winner**
Best Customer Service	Cell Signaling Technology
Best Use of Digital Media	Thermo Fisher Scientific
Most Helpful Sales Reps	Waters
Best Technical Support	Bio-Rad Laboratories
Most Memorable Advertisement	MilliporeSigma
Most Useful Website	Abcam
Best New Product—Genomics	Illumina, Infinium Global Screening Array
	Illumina, MiniSeq Sequencing System
Best New Product—Protein Research	GE Healthcare, Amersham PhastSystem for SDS-PAGE analysis
Best New Product—Cellular Research	Thermo Fisher Scientific, Invitrogen GeneArt Engineered Cell Models
Best New Product—General Lab Equipment	Thermo Fisher Scientific, TSX Ultra-low Temperature Freezers
"Greenest" Life Science Company	GE Healthcare Life Sciences
2017 "Company to Watch"	10X Genomics

The winners are a who's who of life science providers, highlighting the breadth and expertise of companies that support life science research and testing. Companies with broad product lines, such as Thermo Fisher Scientific and MilliporeSigma, were represented, as were more specialized businesses, including Abcam and 10X Genomics. Regardless of the product type or company size, every business relies on innovative products, quality service and support, and a strong marketing presence to succeed.

"The Life Science Industry Awards mean a lot to the companies that are nominated," noted Bill Kelly, president & co-founder of BioInformatics LLC. "Unlike many other awards, scientists in labs all over the world participated in the voting to recognize the companies that go above and beyond in supporting their customers."

The five finalists for each category were nominated by 2,000 members of BioInformatics LLC's Science Advisory Board, a research panel of over 80,000 scientists worldwide. To determine the winners, BioInformatics LLC applied a Customer Value Score, which measures customer satisfaction and loyalty for each company.

"The number of votes received counted for only 25% of a company's score. We also asked these scientists to rate their level of satisfaction with the supplier on different attributes associated with each category," stated Mr. Kelly, explaining the methodology. "That way we measure not just a company's popularity but also the depth of their customers' loyalty—this counts toward the other 75% of the company's score."

At the award ceremony, winners acknowledged their customers' appreciation. Accepting Thermo Fisher's Award for

Best Use of Digital Media, Carlos Herrera, senior Product Manager, e-Business, told the audience, “I think each one of us should be proud of how we’re enabling the customer to succeed.” He told ***IBO*** that it was an honor for the company to be recognized for helping to make the world a healthier, cleaner and safer place. Thermo Fisher won awards in three categories.

Francis Van Parys, general manager, Commercial, Cell Culture, at GE Life Sciences, accepted the Award for Best New Product—Protein Research for the company’s Amersham PhastSystem. He said winning was especially meaningful given the company’s long history in protein research and product’s evolution.

MilliporeSigma was the winner for most memorable advertising. “We’re really honored,” stated Heather Hargett, head of Academic Segment Strategy at MilliporeSigma, Regarding the company’s advertising philosophy, she told IBO, “We want to be there first with the customers, understand their research challenges and help them find the solutions.”

Over 100 people, including representatives from 36 companies, attended the event. This year’s LSIAs were sponsored by BroadOak Capital Partners, Chempetitive Group and DigitalScience.

Third Quarter Maintains Strong Sales Trend

Sales growth for large publicly held instrument and lab product companies remained sturdy in calendar year third quarter, as end-market demand reflected a similar pattern compared to the second quarter. However, for a number of companies, sales in biopharmaceutical markets and China were ahead of expectations and grew at a faster pace sequentially. Also divergent from the previous quarter was academic and government demand, which subsided as a result of slower-than-anticipated spending in Europe. Life science-related sales remained strong, driven by demand from biopharmaceutical and food markets, especially in China, as well as continued adoption into clinical markets.

Combined calendar year third quarter sales for the 23 companies or business units in the *Life Science and Analytical Instrument Indexes* (*LSA Indexes*) grew 4.8% organically year-over-year, compared to 5.2% in the second quarter and 6.1% in the previous year. Market and sales growth rates are based on company data as well as ***IBO*** research estimates. Further financial reviews of the companies can be found in Third Quarter Financial Results and in the November 15 issue of ***IBO***. All sales figures below are organic and are based on constant exchange rates for foreign companies when converted into US dollars.

Biopharmaceutical Markets

Sales for biopharmaceutical markets for the *LSA Indexes* grew nearly 11%, which was heavily weighted by larger companies such as Agilent Technologies, Waters and Thermo Fisher Scientific, for which total end-market sales climbed 16%, 13% and 11%, respectively. Biopharmaceutical sales also grew double digits for both Merck KGaA Life Science (Merck LS) and Bio-Techne. The two Japanese firms, HORIBA and Shimadzu, likewise reported strength in biopharmaceutical markets.

Biopharmaceutical demand continued to be driven by technology upgrades, new products, service solutions and single-use technologies. Within the large-molecule space, demand was robust for research, development and production. Meanwhile, continued strength in small-molecule applications expanded demand for new systems and services. Geographically, biopharmaceutical sales were particularly robust in China and India.

Applied Markets

Although fluctuating by demand and geographic region, applied markets for the *LSA Indexes* were healthy, with sales growing approximately mid-single digits. China was again a bright spot for most companies, as food testing sales for Agilent and PerkinElmer grew 10% each, and advanced 7% for Waters. Although at a slower pace, Thermo Fisher reported healthy food testing sales as well as higher environmental sales. Both Biotage and QIAGEN experienced strong demand from applied markets, led by clinical, food and forensic applications.

Overall, environmental sales grew at a slower pace than in the second quarter, with slower demand in the US and certain European regions. PerkinElmer reported a sharp decline in environmental sales, especially toward the end of

the quarter. On the clinical side, Illumina reported strength in China, while Bruker was negatively impacted by slower MALDI BioTyper sales due to earlier distribution issues in China.

Academic and Government Markets

Academic and government sales, which were roughly flat for the *LSA Indexes*, experienced further spending constraints, especially in Europe. Funding delays and restricted spending in Western European regions surprised a number of companies during the quarter. In addition, US academic and government demand, while positive, decelerated sequentially for certain firms. However, academic and government sales in Asia outside of Japan were steady.

Waters experienced the sharpest decline in academic and government sales, which slumped 15% due to weakness in Europe, Japan and the US, but was also impacted by timing issues. Bruker and Oxford Instruments each recorded mid- to high-single digit declines in this market, with discernible weakness in Europe and the US. Agilent and PerkinElmer each reported low single digit sales declines in the academic and government markets. Thermo Fisher reported a modest 1% growth for this market with slightly higher demand in the US but lower sales in the rest of the world.

In contrast, academic and governments sales for Illumina jumped 16%, but benefited from delayed orders in the first half of the year. Bio-Rad Laboratories' Life Science segment also defied the negative trend for these markets, as sales grew in the mid- to high single digits based on normalized orders in the previous year.

Industrial Markets

Similar to the first half of the year, industrial markets remained challenged, as sales to these markets in the *LSA Indexes* contracted roughly 4%. However, while weakness in the oil markets continues to constrain capital equipment purchases, several companies reported increased demand for aftermarket sales. Nevertheless, industrial sales for Agilent, Thermo Fisher and Waters each declined in the 3%–4% range, and dropped at a slightly higher rate for both Bruker and PerkinElmer.

Geographic Markets

Geographically, China was the strongest growth contributor to the *LSA Indexes*, as sales grew roughly 20%, including 85% and 30% growth for Illumina and Waters, respectively. Furthermore, sales in China grew more than 25% for Agilent, 23% for QIAGEN, 18% for Thermo Fisher and 14% for Bruker. Most companies experienced significant demand from biopharmaceutical and food markets. Sales in the Americas and Europe were constrained but managed to grow roughly in the single digits each, with slightly higher growth in the US. There was little improvement in Japan, as sales declined modestly.

Life Science Index Sales: *Third quarter* ***IBO*** *Life Science Index sales advanced 7.1% organically to $3,662 million. Becton, Dickinson's BD Biosciences was added to the Index with this issue. Demand from biopharmaceutical markets remained robust in the quarter for research, process and production applications. Clinical markets were also strong, while slowing sales to academic and government markets were less pronounced within the life science areas. NGS-related sales were again sturdy for most companies, especially for*

Analytical Instrument Index Sales: *Third quarter sales for the* ***IBO*** *Analytical Instrument Index grew 2.4% organically to $3,718 million. Similar to the second quarter, growth was driven by sales of MS, LC and lab automation products to biopharmaceutical and applied markets. Industrial markets remained challenged, and sales to academic and government customers slowed. Demand for spectroscopy and materials analysis products was solid, led by higher sales and pricing for*

sample preparation and sequencing consumables. However, Illumina reported a significant sales decline for high-throughput systems due to a strong year-over-year comparison and a missed sales opportunity. Flow cytometry sales were also healthy as a result of greater adoption by biopharmaceutical customers. Sales of protein and cell analysis products also contributed to growth. Adjusted operating margin slipped 90 basis points to 23.0%.

NMR and electron microscopy. However, materials characterization sales were negatively impacted by weak oil markets. Adjusted operating margin expanded 120 basis points to 20.4% driven by restructuring activity and cost control measures.

Reported **IBO** Index *sales growths exclude acquisitions and are based on constant exchange rates for international companies when converted into US dollars.*

IBO Life Science Index *businesses: Becton, Dickinson's (BD Biosciences); Bio-Rad Laboratories (Life Science); Biotage; Bio-Techne (Biotechnology, ProteinSimple); Brooks Automation (Life Science Systems Products); Fluidigm (Product); Illumina; Merck (Life Science); NanoString Technologies; PerkinElmer (Human Health); Tecan (Life Sciences) and Thermo Fisher Scientific (Life Science Solutions).*

IBO Analytical Instrument Index *businesses: Agilent Technologies (Life Sciences and Applied Markets, Agilent Crosslab); Bruker (Scientific Instruments); Horiba (Process and Environmental Instruments & Systems, Scientific Instruments & Systems); Oxford Instruments; PerkinElmer (Environmental Health); Shimadzu (Analytical and Measuring Instruments); Spectris (Materials Analysis); Thermo Fisher Scientific (Analytical Technologies) and Waters.*

Contrary Direction for IBO Stock Indexes

If an inflated stock market is the path to making "America Great Again," the US markets are certainly pushing a self-fulfilling prophecy. Following President-elect Donald Trump's victory on November 8, the Dow Jones Industrial Average, S&P 500 and NASDAQ charted a steady climb, rallying 5.4%, 3.4% and 2.6% for the month, respectively. While valuations are not trading at bubble levels as experienced in the past, equity prices are clearly factoring future economic stimulus, which will be needed to support higher market gains. However, the US economy is already showing signs of economic acceleration due to robust consumer spending in the fourth quarter. For the year, the Dow, S&P 500 and NASDAQ are up 9.7%, 7.6% and 6.3%, respectively.

Laboratory Instruments and Products

Despite most companies trading higher, the *Index* declined 0.7% in November to close at 243.76. Following a significant drop in the previous month, **Fluidigm** climbed 38.9% in November to lead the *Index*. The company posted adjusted third quarter EPS ahead of expectations on November 3 despite its preannounced sales short fall last month (see ***IBO*** 10/15/16). While the company did not provide fourth quarter guidance due to an ongoing business review, it projected a slightly optimistic tone during its conference call.

Likewise, **Illumina**, which also preannounced a revenue shortfall in October (see ***IBO*** 10/15/16), likewise, reported better-than-expected third quarter adjusted EPS due to lower SG&A expenses. However, the company cut its 2016 adjusted EPS guidance on November 1 from $3.48–$3.58 to $3.27–$3.32 because of slower HiSeq demand. Furthermore, on November 29, the company filed an 8-K with the SEC stating that Executive Vice President, Clinical Genomics Tristan Orpin will resign in January 2017 and that a successor has already been selected. Shares contracted 2.5% the following day, resulting in a 2.2% decline for the month.

Several other companies posted stronger-than-expected financial results, including **Bio-Rad Laboratories** and **Mettler-Toledo International**. On November 1, **Bio-Rad** posted third quarter sales (see Third Quarter Financial Results) and adjusted EPS well ahead of consensus due to strong demand for its Digital PCR products, process chromatography an d diagnostic instruments. The company raised its full-year currency-neutral sales growth

outlook from 2.5%–3.0% to more than 4.0%, leading shares up 9.8% for the month.

Led by strong organic growth and margin improvements, **Mettler** readily topped third quarter revenue and adjusted EPS expectations on November 3. The company also raised its 2016 adjusted EPS from $14.40–$14.50 to $14.61–$14.66 for growth of roughly 13%. Fourth quarter adjusted EPS is expected to grow 9%–10% to $5.08–$5.13. Shares improved 2.0% for the month.

Similar to **Bio-Rad**, shares for both **QIAGEN** and **NanoString Technologies** benefited from positive earnings reports, as shares rallied 12.1% and 13.1% for the month, respectively. However, both companies maintained their previous guidance. On November 3, Bank of America upgraded **QIAGEN** from "Underperform" to "Neutral."

MTS Systems climbed 13.2% for the month despite announcing on November 29 that it would delay its fiscal fourth quarter and year-end filing due to an internal investigation (see MTS Investigates Its Chinese Operations). However, the company preannounced a stronger-than-projected fiscal 2016 sales range of $645–$650 million, and estimated GAAP EPS of $1.65–$1.70 compared to its previous guidance of $1.35–$1.50.

Although fiscal fourth quarter earnings results were strong for both **Agilent Technologies** and **Becton Dickson (BD)**, shares improved a modest 0.9% and 0.7% for the month, respectively. **BD** reported 9% adjusted EPS growth on November 3, and projected fiscal 2017 EPS of $9.45–$9.55, for growth of 10.0%–11.0%. The company also raised its quarterly dividend by 11% on November 21 to $0.73 per share.

Meanwhile, on November 15, **Agilent** reported that adjusted EPS grew 18% as the company benefited from stronger-than-expected biopharmaceutical demand and sales in Europe. The company projected a more conservative adjusted EPS growth of 8% to $2.10–$2.16 for fiscal 2017. Fiscal first quarter adjusted EPS is projected to be $0.48–$0.50. On November 17, the company raised its quarterly dividend by 15% to 13.2 cents.

Bruker reported mixed financial results on November 2, with sales below expectations but earnings significantly higher due to restructuring measures. The company slightly lowered its 2016 organic sales growth outlook, but raised its adjusted EPS guidance from $0.97–$1.02 to $1.07–$1.11. Despite the softer topline projection, sales advanced 10.7% for the month.

As expected, several companies were negatively impacted by earnings results or outlooks. **Pacific Biosciences** recorded the largest monthly decline in the *Index*, falling 10.5%. On November 2, the company quantified lower Sequel instrument orders and cut its projected 2016 sales target from $93 million to $86–$90 million.

PerkinElmer and **VWR**, which tapered 0.3% and 1.1% for the month, respectively, both missed third sales projections due to weak academic funding in Europe. On November 7, **PerkinElmer** condensed the top-end of its 2016 adjusted EPS range by $0.08 to $2.75–$2.77. **VWR** maintained its 2016 adjusted EPS guidance of $1.68–$1.74, but projected sales to reach the low end of its range.

Several other larger companies, such as **Thermo Fisher Scientific** and **Waters**, recorded notable declines for the month, sliding 4.7% and 3.3%, respectively.

Similar to both **Illumina** and **Fluidigm**, top line growth for a number of companies reporting financial results this month were negatively impacted by weak academic and government funding, as well as muted industrial demand. However, in spite of these challenges, most companies managed to beat analysts' EPS expectations due to cost saving measures, margin improvements, share repurchases and overall modest projections.

Diversified Instrumentation

The *Index* grew 5.0% in November to 205.28 and is up 9.4% for the year. Except for **Danaher**, which slipped 0.5%, all other companies traded higher. **Teledyne Technologies** recorded the largest gain, climbing 16.0%. Despite missing revenue projections, the company easily beat third quarter adjusted EPS consensus on November 3. In addition, the company raised its 2016 adjusted EPS outlook from $5.10–$5.20 to $5.26–$5.31.

Similar to **Teledyne**, both **AMETEK** and **Xylem** missed third quarter sales expectations on November 1, but reported earnings slightly ahead of consensus. **Xylem** narrowed its adjusted EPS range from $2.00–$2.06 to $2.02–$2.04, yet shares climbed 6.7% for the month. **AMETEK** lowered its 2016 adjusted EPS range by $0.01to $2.29–$2.31. However, on November 3, the company raised its share repurchase plan by $400 million, leading shares up 7.4% for the month.

In ratings news, on November 2, Janney Montgomery Scott upgraded **Xylem** from “Neutral” to “Buy” and set a $52 price target. Cowen and Company upgraded **Danaher** on November 11 from “Market Perform” to “Outperform.”

International

While Asia Pacific equity markets were mixed in November, sharp declines were recorded by certain Southeast Asian Indexes. In contrast, Japan’ Nikkei 225 and China’s Shanghai Composite advanced 5.1% and 4.8%, respectively

Prices for all Pacific Region companies in the ***IBO*** Stock Table traded higher in November, except for **Techcomp**, which was unchanged. **GL Sciences** rocketed 25.6% to lead all companies, as the company reported on November 4 that fiscal second quarter EPS jumped more than threefold to ¥31.23 ($0.31).

Shimadzu surged 14.0% for the month. However, the company reported on November 7 that fiscal 2017 second quarter net income slipped 3.3% to ¥7.27 billion ($71.0 million), primarily due to currency.

Precision System Science, which climbed 9.4% for the month, reported on November 14 that fiscal first quarter EPS loss narrowed 12% to ¥8.64 ($0.08).

Following a weak performance in the first half of the year, **HORIBA** recorded strong third quarter EPS growth of 48% to ¥74.52 ($0.73). The company maintained its 2016 EPS guidance of ¥256.40 ($2.40). Shares improved 1.4% for the month.

On November 11, **JEOL** reported an EPS loss of ¥26.57 ($0.25) for the fiscal half-year 2017 compared to a profit of ¥13.45 ($0.11) in the previous year. Yet shares advanced 2.7% for the month.

Most European equity markets traded lower in November, led by the Spain IBEX 35 and London FTSE 100 Indexes, which eased 5.0% and 2.5%, respectively. However, Sweden’s OMX Stockholm 30 expanded 2.4%.

Prices for European companies in the ***IBO*** Stock Table were mixed. **Scientific Digital Imaging** recorded the largest gain for the month, climbing 25.0%, while **Horizon Discovery** sank 12.0%.

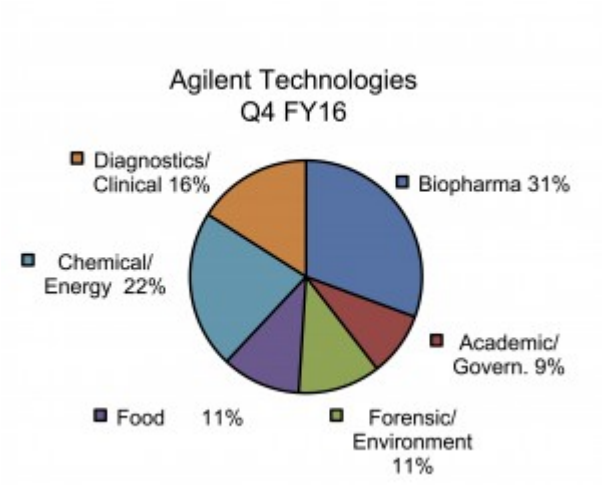
Two other UK firms, **Oxford Instruments** and **Halma** declined for the month, sinking 7.8% and 10.0%, respectively. On November 14, **Oxford** reported that adjusted EPS was unchanged at 21.3 pence ($0.29) for the fiscal 2016 half year. **Halma** reported a stronger result on November 22, as adjusted EPS for the fiscal half year grew 13% to 17.23 pence ($0.24). However, much of the growth was attributed to currency. The company also raised its interim dividend by 7% to 5.33 pence ($0.07).

Benefiting from the acquisition of **Sigma-Aldrich** (see ***IBO*** 9/30/14) and strong Life Science sales, adjusted third quarter EPS for **Merck KGaA** climbed 29% to €1.70 ($1.47), as reported on November 16. The company also raised its adjusted 2016 EPS outlook by 5% to €6.15–€6.40 ($6.83–$7.11). However, shares improved only 0.9% for the month.

Third Quarter Financial Results

Agilent Delivers Strong FY Close

Fiscal fourth quarter sales for Agilent Technologies ending October 31 climbed 7.3%, 6.3% organically, to $1.11 billion. Currency and acquisitions, net of divestments, added 0.4% and 0.6% to sales, respectively. Organic revenue growth propelled past company expectations due to continued demand in the biopharmaceutical, food and diagnostics markets, as well as stronger-than-projected sales of analytical instrumentation. Strong service revenue also contributed to organic growth. Furthermore, academia and government sales declined at a more moderate pace than anticipated due to stabilized spending in Europe.



All sales figures below are based on organic growth. Despite a strong comparison of 19% growth in the previous year, biopharmaceutical sales jumped 16%, as a result of new products, technology upgrades and greater demand for Agilent's enterprise service offering. Applied markets were also healthy, especially in China, as food sales advanced 10%, and environmental and forensics revenue improved 3%. Diagnostics and clinical sales grew 8%. However, academia and government sales declined 2%. In spite of higher service and consumables sales, chemical and energy sales fell 3% due to weakness in oil markets.

Life Sciences and Applied Markets Group sales grew 5% organically. This represents the segment's strongest quarterly organic sales growth in fiscal 2016 when normalized for timing of orders in the fiscal second quarter. Sales of LC, LC/MS and ICP-MS were particularly strong from biopharmaceutical, food and forensics customers, but were partially offset by lower instrument demand from chemical and energy markets.

CrossLab Group sales expanded 8%, led by demand from food and environmental markets, especially in Asia. By product, sales were strong for LC columns, lab supplies and contract services.

Diagnostics and Genomics Group sales expanded 8%, including double-digit sales growth for the Nucleic Acid Solutions business. The Pathology business also performed well, driven by demand for reagents and companion diagnostics.

Geographically, company sales in Asia Pacific (excluding Japan) and Europe grew above expectations, climbing 19% and 4%, to account for 31% and 36% of revenues, respectively. Sales in China grew more than 25%. Sales in both the Americas and Japan were roughly flat to represent 36% and 6%, respectively. Adjusted operating margin expanded 60 basis points to 22.5%.

For fiscal 2016, Agilent sales grew 4.1%, 5.9% organically, to $4.20 billion. Currency and divestment headwinds reduced sales growth by 0.1% and 2.0%, respectively. All sales figures below are based on organic growth. Biopharmaceutical and food sales climbed 15% and 11% to account for roughly 29% and 11% of revenues, respectively. Environmental and forensics revenue advanced 3%, and diagnostics and clinical sales grew 7% to make up 12% and 15%, respectively. Accounting for 9% of revenue, academia and government sales improved 1%. Chemical and energy sales contracted 3% to account for 23%.

Agilent Technologies FY16						
	Q4			FY		
	Rev. ($M)	Growth	Org. Growth	Rev. ($M)	Growth	Org. Growth
Life Sciences and Applied Markets	$548	6.4%	5%	$2,073	1.3%	5%
Diagnostics and Genomics	$193	8.4%	8%	$709	7.1%	8%
Agilent CrossLab	$370	8.2%	8%	$1,420	6.8%	8%

Asia Pacific delivered the strongest growth, with sales climbing 13% to make up 37% of revenues. Within this region, sales in China jumped 21% but declined 3% in Japan. Sales to the Americas and Europe grew 2% each to make up 35% and 29%, respectively. Adjusted operating margin improved 110 basis points to 20.7%.

In view of uncertain industrial demand, as well as US and European government spending, Agilent initiated a conservative fiscal 2017 organic sales growth outlook of 4.0%-4.5% to $4.35–$4.37 billion. Biopharmaceutical sales growth is expected to moderate to the mid- to high single-digit range as a result of the strong comparison. Academia and government sales are projected to grow in the low single digits, with strength in China partially offset by weakness in Europe and the US. Chemical and energy sales are expected to be flat.

Fiscal first quarter 2017 sales are expected to grow 2.2% organically at the midpoint to $1.04–$1.06 billion as timing of the Chinese Lunar New Year is projected to shift $15 million in sales from the fiscal first quarter to the fiscal second quarter.

Bio-Rad LS Sales Surge

Third quarter sales for Bio-Rad Laboratories' Life Science (LS) segment soared 18.4%, 19.3% excluding currency, to $178.1 million to account for 35% of revenues. However, sales growth was inflated by supply chain and production challenges in the previous year, which impacted revenues by roughly $5–$10 million. Assuming the maximum impact of $10 million, third quarter sales would have climbed more than 6% excluding currency. Demand was strong across all product lines, especially for Droplet Digital PCR products, which continued to benefit from liquid biopsy applications. The company also noted healthy growth for process media, qPCR, western blotting and electrophoresis products. Geographically, LS sales were strong in North America, China and certain Pacific Rim regions, such as China and Southeast Asia. The company also reported sales growth in Eastern Europe, while Japanese sales were roughly flat. Reported operating loss narrowed 64.2% to $4.4 million.

Bruker Prunes Outlook Yet Again

For the second consecutive quarter, sales for Bruker's Scientific Instruments (BSI) segment missed company guidance due to continued weakness in industrial markets and constrained spending by European academic customers. As such, third quarter BSI sales declined 2.4% organically to account for 92% of sales. System and aftermarket revenues declined roughly 4% and less than 1% organically to account for 74% and 26% of BSI sales, respectively.

Bruker BioSpin sales grew in the mid-single digits organically, driven by higher pricing and sales of NMR products, including NMR FoodScreeners and NMR clinical research systems. Following a sharp decline in the previous year, Preclinical Imaging sales stabilized and orders improved. Segment growth further benefited from strong aftermarket sales within the LabScape business.

Sales for Bruker CALID contracted roughly 5% organically due to lower European academic demand and a strong comparison for the Daltonics business. In addition, MS sales were primarily impacted by lower MALDI BioTyper orders in China and the Americas due to distribution issues and slow demand, respectively, in the first half of the year. These declines were partially offset by higher sales in the Optics Division.

Bruker Q3 FY16					
	Rev. ($M)	Rev. Growth	Currency	Acq./Div.	Org. Growth
Bruker Scientific Instruments	$361.5	-1.4%	0.3%	1.7%	-3.5%

Bruker Nano Group sales slumped roughly 7% organically and were particularly impacted by industrial markets, as well as academic and government spending in Europe. Sales contracted in the Bruker AXS and Nano Surfaces Divisions each, as well as for industrial-related analytical systems. The one area of positive demand was for fluorescence microscopy products for cell and neuroscience research. The semiconductor metrology business benefited from the Jordan Valley Semiconductors acquisition (see ***IBO*** 10/15/15).

BSI adjusted operating margin improved 194 basis points to 15.5% as a result of stronger NMR pricing and completed restructuring measures within the BioSpin Group. To help offset slower sales volume and maintain margin expansion, the company announced two additional factory consolidations within the CALID and Nano Groups during the quarter. These restructuring measures are projected to produce annualized cost savings of $10–$13 million, with contributions beginning in the second half of 2017.

Geographically, total sales declined roughly 18% in Europe, with particular weakness in Germany and Eastern Europe. Asia Pacific sales grew near double digits, including low teens and low single digit growth in China and

Japan, respectively. The company reduced its 2016 organic revenue growth outlook by 100 basis points to negative 3%. Including acquisitions, reported 2016 sales are expected to slip 1%.

QIAGEN Growth Trending Up

Third quarter sales for QIAGEN advanced 7.7% to $ 338.7 million, including 1% headwinds from currency and 3% growth from acquisitions. The company maintained its trajectory of higher organic growth over the last consecutive four quarters, as third quarter organic sales climbed 6%, or 7% excluding US HPV test sales. Overall, sales of consumables and other related products, and instrument sales grew roughly 7% and 4% organically to account for 88% and 12% of revenues, respectively.

Organic Molecular Diagnostics sales grew roughly 9%, or 11% excluding US HPV sales. Demand for QIAsymphony consumables were particularly strong with sales growth in the double digits. QIAsymphony TB test sales remained on par with the company's annual growth target of roughly 25%. In the personal healthcare business, sales of Ipsogen blood cancer tests increased, and revenues from codevelopment projects for companion diagnostics, which tend to be volatile, jumped 66% excluding currency.

Life sciences-related sales grew approximately 3% organically to account for 50% of revenues. Organic Pharma and Academia sales advanced roughly 3% and 2%, respectively. Applied Testing sales grew roughly 5% organically, driven by increased demand for new human ID and forensics products in the Americas and Asia Pacific.

QIAGEN Q3 FY16					
	Rev. Growth	Currency	Acq. (Est.)	Org. Growth (Est.)	% of Rev.
Molecular Diagnostics	8%	-2%	1%	9%	50%
Applied Testing	11%	-1%	7%	5%	9%
Pharma	6%	-2%	5%	3%	20%
Academia	9%	2%	5%	2%	21%

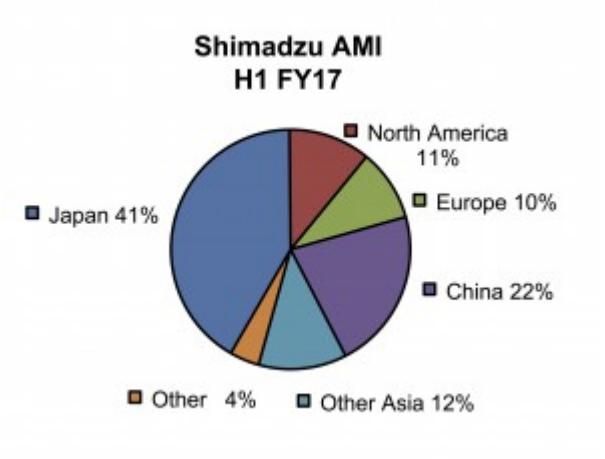
Geographically, sales were particularly strong in the Asia-Pacific/Japan region, as they grew just under 20% organically to make up 21% of revenues. Specifically, sales in China, Japan, India and South Korea each grew in double digits. Accounting for 49% of revenue, sales in the Americas grew in the high single digits, or roughly 11% excluding HPV revenue, including double-digit growth in both Brazil and Mexico. Despite sales growth in France and the UK, total European sales declined organically due to weak spending in Germany. As such, sales in the Europe/Middle East/Africa region declined in the low single digits organically to make up 30% of revenues. However, sales increased in the Middle East, Russia and Nordic regions.

Total adjusted gross margin expanded 60 basis points to 71.3% due to product mix and restructuring measures. Adjusted operating margin advanced 75 basis points to 10.9% as a result of lower R&D investments. The company maintained its full-year currency-neutral sales growth forecast of 6%–7%, comprised of 4%–5% organic growth and 2% from acquisitions. Fourth quarter sales are projected to grow 6%. QIAGEN will also implement certain restructuring measures in the fourth quarter, including the closure of two facilities and consolidation of service centers, resulting in a $75 million pre-tax charge. Finally, the company initiated an organic revenue growth outlook of 5%-6% for 2017.

Shimadzu Gets Boost From Asia

Shimadzu Analytical and Measuring Instrument (AMI) fiscal 2017 second quarter sales declined 5.8% to ¥51.2 billion ($500 million = ¥102.38 = $1). However, excluding currency, AMI sales grew roughly 4%, led by LC and MS demand. Operating margin expanded 58 basis points to 18.0%.

For the first half of the year, AMI sales contracted 4.0% to ¥93.7 billion ($891 million = ¥105.16 = $1) to account for 61% of revenues. Excluding currency headwinds of 8.3%, AMI revenue improved 4.3%. In local currency, aftermarket and instruments sales grew roughly 7% and 3% to account for 28% and 72% of segment sales, respectively. Demand was strongest for LC and MS products, for which currency-neutral sales climbed 6% and 8% to account for 29% and 17% of AMI revenue, respectively.



The company reported sturdy regional demand, as Japanese sales improved 4.5%, including particular strength for LC and MS products from pharmaceutical and chemical customers. Higher sales of surface analyzers further contributed to regional growth. Sales in China climbed 8.5%, driven by demand for MS products from pharmaceutical and CRO firms, as well as from government markets for food testing applications. Sales in Other Asian countries were particularly strong, climbing 17.3% excluding currency. This growth was driven by strong MS demand in India, as well as higher LC sales and a large order for testing machines in Southeast Asia.

Conversely, currency-neutral sales in Europe and North America slipped 1.4% and 1.0%, respectively. Despite the declines, MS sales for environmental and clinical applications improved in Europe, as did sales of LC and other equipment in North America. Sales to Other regions contracted in the double digits, including weakness in South America.

AMI operating margin advanced 60 basis points to15.1%. Fiscal 2017 sales outlook for AMI was unchanged at ¥218.0 billion ($2.1 billion) for growth of 4.6%.

CY Q3 2016 Results								
	Revenues			Rev. Growth Summary			Adj. Operating Profit	
	Rev. ($M)	% of Co. Rev.	% Growth	% Currency	% Acq./Div.	% Org. Growth	($M)	% Growth
Agilent Technologies	$1,111.0	100%	7.3%	0%	1%	6%	$247.0	10.8%
Bio-Rad Laboratories (Life Science)	$178.1	35%	18.4%	-1%	0%	19%	NA	NA
Bruker (Scientific Instruments)	$361.5	92%	-1.4%	0%	2%	-3%	$56.0	12.7%
QIAGEN	$338.7	100%	7.7%	-1%	3%	6%	$86.8	10.9%
Shimadzu (Analytical & Measuring Inst.)	¥51,200.0	61%	-5.8%	0%	-10%	4%	¥9,243.0	-2.7%

Discrete Analyzers

A discrete analyzer is an instrument designed to automate manual wet chemistry methods by automatically and precisely adding a sample and reagent into a small cell or cuvette, and then allowing a detector to measure the resulting product. Most discrete analyzers are simple to set up and are designed to run samples unattended, enabling high-throughput results and a reduction in laboratory costs. The technology is similar but distinct from continuous flow analyzers, which use segmented flow analysis or flow injected analysis to perform batch analysis on a continuous carrier stream.

Discrete analyzers are generally capable of performing anywhere from 150 to 1,000 tests per hour using minimal reagent volume. The instrument typically consists of a tray that holds numerous sample bottles, a separate tray for storing reagents, a robotic arm with a pipette or syringe, small reaction vessels, at least one detector, and containers used for rinsing and storing waste. The onboard hardware components are usually controlled through software, which the analyst uses to define the desired testing parameters, run calibrations, etc. In fact, most systems have pre-programmed methods.

Once the program is established, the analyst fills the sample bottles and puts them in position in the sample tray. When the program begins, the robotic arm automatically collects the sample with a pipette or syringe and disperses it into a small reaction vessel, along with the appropriate reagent. The reaction vessel mixes the sample and reagent at the desired temperature until it is ready for measurement, at which point the reaction product is read optically using one or more onboard photometric or colorimetric detectors. Afterward, the reaction wells are automatically washed and rinsed, along with the pipette or syringe. The cuvettes storing the samples can be reused or disposed of as necessary. Results of the analysis can be obtained and viewed through the instrument's software.

Discrete analyzers provide consistently accurate measurements for a variety of applications. The two largest end-markets for the technology are environmental, and agriculture and food labs. Specific applications in environmental testing include analyses of wastewater, drinking water and surface water. For food testing, many discrete analyzer vendors have developed models specifically tailored for one type of product, such as wine, beer, enzymes, proteins, fertilizers or tobacco.

One of the largest suppliers of discrete analyzers is Seal Analytical, which specializes in environmental applications. Their latest model, the AQ400, was released in 2015. Thermo Fisher Scientific offers three models in its Gallery line of discrete photometric analyzers, including the Gallery Plus Beermaster analyzer that is marketed to breweries. Other suppliers include Astoria Pacific, Skalar and Systea.

In 2015, the total market for discrete analyzers was about $30 million. It has grown in recent years as environmental agencies increasingly recommended its methods. Looking ahead, instrument sales are expected to remain modest, sustained by agriculture and food, and other industries looking to replace manual QC testing methods.

Discrete Analyzers at a glance:

Leading Vendors:

- Seal Analytical (Porvair)
- Thermo Fisher Scientific
- Systea

Largest Markets:

- Environmental
- Agriculture and Food
- Government

Instrument Cost:

- $15,000–$200,000

Government

In 2014, the Sunscreen Innovation Act (SIA) established a new review process for analyzing the safety and efficacy of new active ingredients added to OTC sunscreens. At that time, eight active ingredients were already under review by the FDA to determine whether they were generally recognized as safe and effective (GRASE) for OTC sunscreens. On November 22, the FDA released a final guidance document recommending that the industry perform Maximum Usage Trials and share data from the trial results to help the FDA determine if some active ingredients are absorbed into the skin and blood, and in what amounts. The guidance document also recommended that data from human dermal safety studies (which includes human irritation and sensitization studies, and human photosafety studies) and pediatric considerations be shared with the FDA for GRASE determination. In regards to nonclinical safety testing, the FDA recommended that dermal and systemic carcinogenicity studies be conducted for OTC sunscreen active ingredients by applying the ingredient-infused products onto rats or mice over a six-month to two-year period. Developmental and reproductive toxicity studies and toxicokinetics are also recommended to ensure that active OTC sunscreen ingredients do not have negative neuroendocrine effects.
Source: *FDA*

Genomics

Next month, a meeting will be held in Mexico for the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising From Their Use, part of the UN's Convention on Biological Diversity. In effect since October 2014, the Protocol was created to ensure that developed countries do not exploit genetic resources from less wealthy countries. Eighty-nine countries are part of the Protocol—the US is not one of them. The Protocol ensures that providers and users of genetic resources from developing countries properly distribute any subsequent intellectual property rights or royalties arising from the genetic resource. The meeting next month tackles the question of whether the Protocol agreement should also apply to digital DNA sequences that may not ever touch a physical sample. If the agreement is extended to digital DNA sequences, the Protocol requirements may be challenging to enforce, as it is difficult to access and claim the rights for a sequence and may also interfere with the collaborative nature of R&D. It is also difficult to keep track of which sequences become profitable, as there is not always a clear, traceable path to the origin of a sample. This can potentially lead to biopiracy, the profiting of a biological product without any sharing of the profit with the location of the sample's origin. Moreover, not all countries require the documentation of genetic resources. For example, China and Brazil require that all patent applications name the origin country of any genetic resources used, but the US does not. Changing the system to ensure proper attribution to the sample's origin also raises questions. It is unclear how much a sequence would have to contribute to a new product in order for the creator of the product to share profits; and what country should get the rights to a sequence if identical sequences are found in various countries.
Source: *Science*

R&D

In the latest *Nature* Index analysis from November 16, data indicated that in regards to research collaboration in 2015, the US was one of the top countries for scientific collaboration with other countries. The US was part of 8 out of the top 10 collaborations by country, and had the highest total bilateral collaboration score (CS) in each of those partnerships. The US's collaboration with China has the highest score in global country collaborations, followed by the US and Germany, the US and the UK, the US and France, and the US and Canada. The US also has collaborations with Japan, Italy and Australia. Research partnerships between the UK and Germany, and France and Germany round out the top 10 country collaborations. Although US collaborations represented 3% of global research partnerships, the country's CS represented 38% of total CS in the Index. The US's collaborations emphasized physical sciences research, with the subject also representing 46% of total global collaborative published articles and papers. This was followed by life sciences, which represented 26% of total multi-national articles, then chemistry, which made up 21%, and the earth and environmental sciences, which represented 7%. Papers for physical sciences, life sciences and chemistry increased 12%, 19% and 29%, respectively, while papers for earth and environmental sciences decreased 7%.
Source: *Nature*

Turkey

In 2015, Turkey's gross domestic expenditure on R&D (GERD) increased by 17.1% to TRY 20.615 billion ($16.232 billion = TRY 1.27 = $1). The country's total GERD as a share of GDP was 1.06%, up from 1.01% in 2014. GERD has been on a steady rise since 2003, when GERD as a share of GDP was 0.48%. In 2015, R&D in the business sector represented 50% of total R&D expenditure, followed by higher education at 40%, and government at 10%. The business sector also financed 50% of R&D expenditures, with the government and higher education financing 28% and 18%, respectively. Labor cost made up 54% of GERD, with instruments and equipment accounting for 35% of costs. R&D personnel also increased in 2015, with the number of full-time equivalent R&D personnel jumping 5.9% to 122,288. Of this, 55% were employed in the business sector, 35% were employed in higher education and 10%

were government employees. Based on regions, West Antolia had the greatest R&D expenditure with 28%, followed by Istanbul and East Marmara with 22% and 21%, respectively. Istanbul, West Anatolia and East Marmara also had the greatest full-time equivalent R&D personnel, representing 24%, 21% and 14%, respectively.
Source: *Turkish Statistical Institute*

India

Gross expenditure on research and development (GERD) in India has doubled since 2007, reaching $44 billion in 2014. The same year, India contributed 2.7% of overall global R&D expenditure. As a share of GDP, India's GERD has been 0.88%–0.90% between 2011 and 2015. For the past six years, India has had the fastest growing economy in the world, increasing 6.5% on average between 2011 and 2015, and growing 7.3% in 2016. This has resulted in an increase of 15% in domestic GERD between 2011 to 2016. The two main sources of funding in India are government and business enterprise, which represented 64% and 35% of total R&D funding, respectively, from 2011 to 2012. Between 2015 and 2017, federal R&D allocations for the top 10 science agencies increased by 63%. Federal R&D funding for strategic science sectors, such as nuclear energy, space and defense, increased between 50% to 120% between 2015 and 2017, while the budget for the Ministry of New and Renewable Energy increased 1,000%, due to Prime Minister Narendra Modi's priority of implementing clean energy systems throughout the nation. The Department of Biotechnology received a 28% increase in allocations in 2016, with the Department aiming to create five new genomics centers revolving around specific fields, such as drug discovery, biology and infection, as well as more niche sectors like GMOs and vaccines.

After the election of Prime Minister Modi's government in 2014, public-private partnerships were heavily encouraged through various policies and flagship programs in all industry sectors, including science and technology. India also attracts a great deal of foreign direct investment (FDI) in R&D, with over 1,070 foreign multinational corporations opening up R&D centers in the country. As a share of FDI, the pharmaceutical and biotechnology sector represents 1.4%, with chemicals making up 1.54%, and metals and minerals contributing 27.01%. In 2015, India was the top "global hotspot" for R&D, accounting for $12.5 billion of the overall $31 billion worth of global R&D activities.
Source: *European Commission*

Argentina

This month, the Argentine government is expected to finalize its budget for 2017, under which funding for science R&D will be cut by 8.5%, or $198 million. Although the current Argentine president proclaimed to double science and technology R&D's share of the government budget from 0.7% to 1.5%, the R&D cuts are being made due to the economic challenges the country is facing. Most affected by the decrease will be the National Scientific and Technical Research Council (CONICET), which will be left with 4%, or $26 million, of its $655 million budget for R&D projects, lab products and research scholarships, while 96% of the budget will go towards salaries. For reference, CONICET allocated 69% of its budget for researcher and scholar salaries in 2014. Up and coming scientists depend heavily on stipends from CONICET to jumpstart their careers in academia, but the future of new positions and opportunities for such researchers at CONICET is uncertain because of the reduced funding. This may lead to new scientists emigrating to other countries, exacerbating the lack of scientific innovation in Argentina.
Source: *Science*

Broad-based Companies

Company Announcements

In September, **American Laboratory Trading** (ALT) announced that **Agilent Technologies** named it part of its

Channel Partnership Program. ALT now offers Agilent's factory-refurbished 1100 Series HPLC Systems and 6890 GC Systems, as well as individual components.

Hitachi High-Technologies' Science and Medical Systems (SMS) fiscal second quarter sales ending September 30 grew 4.0% to ¥46.8 billion ($457 million) to account for 30% of company revenues (see ***IBO*** 10/31/16). Excluding currency headwinds and acquisitions, SMS organic sales grew roughly in the high-single digits. Growth was driven by demand for new clinical analyzers as well as strength in China. Excluding currency, Electron Microscopes sales grew roughly 1%, while Scientific Instruments sales jumped more than 20%. SMS operating margin contracted more than five percentage points to 11.3% due to currency and increased investments.

Third quarter sales for **Mettler-Toledo**'s Lab business grew 8%, 7% organically, to account for 48% of company revenues, or $312 million. All product lines contributed to sales growth. Demand remained strong from biopharmaceutical and food markets, especially in Europe and Asia. Overall, Lab sales climbed double digits in China, driven by demand for pipettes and pH products. Lab sales in the Americas grew, but were restrained by a strong comparison and slower academic and government funding.

Mettler-Toledo announced in November the opening of its Dubai Free Zone Competence Center to provide analytical support and training for customers operating in the Middle East and North Africa. It provides support for all of Mettler-Toledo's Lab products.

In November, **Fluidigm** announced on its third quarter conference call changes to its organization following the appointment of new CEO Christopher Linthwaite (see ***IBO*** 10/31/16). The changes include the reintegration of the commercial organizations and realigned sales and marketing, combining the Applied Markets and Research teams. The new integrated selling team is aligned by geography. He also announced a re-examination of the cost structure and that product releases will be handled "in a more metered manner."

Analytik Jena announced in November the opening of the Rhein-Main Application Center at Germany's **Fresenius University of Applied Sciences**.

In November, **Merck KGaA** announced a €80 million ($89 million) investment in a Life Science Center in Nantong, China, to produce high-purity inorganic salts for APIs and excipients, cell culture media, and ready-to-use media for environmental and sterility testing.

Third quarter sales for **Biotage** climbed 11.6%, 9.5% excluding currency, to SEK 167.0 million ($19.6 million = SEK 8.52 = $1) (see Bottom Line). Driven by demand in China, sales were strong for its evaporation system, V-10 Touch and purification system, Isolera. The company also reported positive demand for aftermarket products in its analytical chemistry business. Overall, sales were led by growth in the Americas and China, which accounted for 46% and 9% of revenues, respectively. Operating margin extended 360 basis points to 16.3% due to favorable currency and productivity improvements.

In November, **Bruker Energy and Supercon Technologies** acquired **Oxford Instruments' Superconducting Wire** business for $17.5 million in cash. The business generated revenue of £19.1 million ($26.2 million) for the six months ending September 30 and an operating profit of £1.1 million ($1.5 million).

Diploma reported that, for the fiscal year ending September 30, sales for its **a1-group** of environmental businesses increased 5% in constant currency to £18.7 million ($26.7 million). With a1, sales for the German-based businesses increased 13% in reported currency, including increased sales of high-end elemental and trace analyzers. Revenue for the UK-based **ai-CBISS** business declined 1%, with reduced revenue from CEMS sales.

Sequencing

Company Announcements

BioDiscovery announced in October the launch of N_xClinical 3.0, a flexible, platform-agnostic database solution for analysis, interpretation and reporting of copy number and sequence variants, as well as absence of heterozygosity. It combines data from arrays and NGS.

Diagenode and **Advanced Analytical Technologies** announced in October a comarketing agreement to promote instrument platform synergies for NGS library preparation, utilizing their respective DNA shearing solutions and Fragment Analyzer Automated CE systems.

In October, **Genohm** and **Interactive Biosoftware** announced a technology partnership and integration of their respective SLims lab management software and Alamut Software Suite for management of any NGS workflow.

QIAGEN announced in November a partnership with **Genohm** to support its NGS solution. The companies codeveloped GeneRead Link for complete chain of custody. QIAGEN also offers its users access to Genohm's SLims solution.

In November, **Interactive Biosoftware** announced a collaboration with **Centogene** to integrate their respective Alamut Visual decision-support software and CentoMD rare disease genetic database.

Zymo Research announced in October that it obtained an exclusive license to a methylation age predictor, known as Horvath's Clock. The technology uses sample DNA from any biological source other than sperm to measure DNA methylation based on 353 epigenetic markets to estimate the biological age of most human tissues and cell types.

Lexogen announced in October a collaboration with **Bluebee** for implementation of its QuantSeq data analysis pipeline on the Bluebee genomics analysis platform.

In October, **Illumina** announced the contribution of over 95,000 human genetic variants to the ClinVar public database.

Q^2 Solutions—EA Genomics, a clinical trials lab services organization, announced an agreement with **Illumina** to establish a framework for developing NGS companion diagnostics assays using the MiSeqDx. Q^2 Solutions—EA Genomics is a **QuintilesIMS** and **Quest Diagnostics** joint venture.

Fluidigm announced a comarketing agreement for **GenomOncology**'s GO Clinical Workbench for molecular interpretation of somatic variants identified using Fluidigm's Juno targeted NGS library preparation workflow.

SeraCare Life Sciences announced in November a collaboration with **ArcherDX** to develop and commercialize highly multiplexed RNA fusion reference materials that support the validation and routine monitoring of the Archer FusionPlex gene fusion detection kits.

In November, **ArcherDX** announced a partnership with **Sophia Genetics** focused on oncology solutions addressing solid tumors and hematological disorders, as well as applications in liquid biopsy and immune repertoire profiling. The agreement will integrate their respective NGS test kits and DDM (Data-Driven Medicine) analytical platform.

Sophia Genetics announced in November a partnership with **Horizon Discovery**, combining their respective artificial intelligence platform and HDx Reference Standards for NGS.

Illumina announced in November an agreement with **Mayo Clinic** to integrate existing services and software tools, and employ new solutions to improve Mayo's reporting workflows for researching inherited diseases. Mayo Clinic will implement Illumina's BaseSpace Clarity LIMS in specific labs and provide feedback on Illumina's BaseSpace Sequence Hub and Variant Interpreter.

In November, **Thermo Fisher Scientific** announced the filing of the final module of a premarket approval application with the **US FDA** for its Oncomine University Dx Test, a multigene NGS-based assay for non–small cell lung cancer. It would serve as a companion diagnostic utilized to select patients for specific therapies. It could also be accessible to global drug companies for ongoing development of therapeutic drugs.

Seven Bridges and **SolveBio** announced in November the integration of their respective cloud-based Seven Bridges Platform and biological data platform. The integration enables joint customers to analyze and annotate large genomic datasets using Seven Bridges' tools and customizable workflows, and then push relevant findings to SolveBio for deep functional interpretation and assessment of clinical impact.

In November, **QIAGEN** announced a five-year Master Assay Development, Commercialization and Manufacturing Agreement with **HTG Molecular Diagnostics** for offering pharmaceutical companies a complete NGS-based solution for the development and commercialization of companion diagostics, with a focus in oncology. QIAGEN also

made an up to $4 million investment in HTG's common stock.

Product Introductions

In October, outside the US, **QIAGEN** launched the QIAsymphony SP instrument as a front-end option for sample processing for its GeneReader NGS System. It provides continuous loading of up to 96 samples. The QIAsymphony SP is registered with the FDA.

Malaysia-based **Novocraft Technologies** introduced in October the NovoWorx NGS data management and analytics platform. It natively supports the novoAlign and novoSort programs.

In October, **BioBam** released Blast2GO 4 for the functional analysis of transcriptomics datasets. It allows the functional annotation, analysis and biological interpretation of de novo sequencing datasets.

DNAstack introduced in October its cloud platform for management, analysis, search and sharing of genomics databases. Users pay only for cloud cost incurred for data storage and computation on the **Google** Cloud. It is the first commercial platform to be built on Google Genomics.

In October, **SeqLL** launched an early access program for its tSMS (Single Molecule Sequencing) System for quantitative sequencing. The amplification-free technology has the capacity to detect low-fold changes and discover rare transcripts.

In October, **Diagenode** released a complete product solution for RNA sequencing using CATS (Capture and Amplification by Tailing and Switching), initially launching the CATS Small RNA-seq Kit. The minimum required input is picogram amounts of RNA.

In November, **Roche** introduced the KAPA RNA HyperPrep product for RNA library preparation. It features a novel chemistry that enables the combination of enzymatic steps and fewer reaction purifications. The strand-specific, single-tube workflows can be completed in a standard workday.

SeraCare Life Science released in November the Seraseq Tumor Mutation DNA Mix v2 (RUO-GMP) and Seraseq FFPE Tumor KRAS Reference Kit Material Kit, two new reference materials for clinical oncology assays.

Sales/Orders of Note

In October, India-based **MedGenome**, a genomics-driven research and diagnostics company, announced the purchase of the **Illumina** Hiseq X Ten platform.

SomaGenics announced in October that it was awarded a $1.8 million two-year **NIH** Small Business Innovation Research Phase II grant to further develop its RealSeq–AC technology for NGS of small RNAs, such as miRNA. The award allows it to further develop the RealSeq–AC library construction approach.

In October, **Pacific Biosciences** announced that the **Genome 10K** and **Bird 10,000 Genomes** initiative have invested in SMRT Sequencing technology, with the order of two Sequel Systems and plans for three additional units.

DNAnexus announced in November that the **Stanford Center for Genomics and Personalized Medicine**, which supports researchers across nearly 80 labs, adopted the DNAnexus Platform on the **Microsoft** Azure cloud.

Molecular Spectroscopy

Company Announcements

In August, **Bruker** announced a strategic partnership with **FlavorActiV** and the launch of the Flavor Stability

Package for its e-scan EPR system to ensure beer freshness.

Wilhelmsen Ships Service announced in August a partnership with **Turner Design** to market the handheld Ballast-Check 2 PAM Fluorometer to check the quality of treated ballast water for compliance with new regulations. A Pulse Amplitude Modulated (PAM) fluorometer, theBallast-Check 2 measures fluorescence emitted by algae in the 10–50 um size range.

Metrohm USA announced in September a partnership with **MarqMetrix** to combine their respective Mira compact Raman spectrometer and TouchRaman BallProbe. The TouchRaman allows measurements to be taken without any sample preparation or handling. Applications include lab, field and process.

In October, **Nanalysis** and **MestreLab Research** announced a collaborative marketing arrangement under which Nanalysis will include MestreLab's Mnova software with its NMReady compact NMR.

In November, **Renishaw** named **Blue Scientific** as a spectroscopy product distributor for the Nordic region.

Datacolor will name Thomas Studhalter to its Board in December. He works at **BDO**, an audit, tax and business law advisory services firm.

Product Introductions

In August, **Oxford Instruments** and **Green Imaging Technologies** launched the GeoSpec12 benchtop NMR core analyzers. The range of systems now includes a 20 MHz unit, as well as the existing 2 MHz and 12 MHz units.

StellarNet released in August the rugged, portable Stellar-CASE Raman system, pre-configured for "open and measure" applications.

Ocean Optics launched in September the Flame-CHEM spectrophotometer for educators. It combines the Flame UV-Vis or Vis NIR spectrometer with an all-in-one, direct-attach light source and cuvette holder.

MyDx released in September the AquaDz sensor chip for the analysis of toxic chemicals in water. It works interchangeably with the MyDx Analyzer.

In October, **MyDx** launched the OrganaDz single-use sensor chip for analyzing pesticides and heavy metals in cannabis, fruits and vegetables.

In September, **Princeton Instruments** introduced the FERGIE spectroscopy system, a fully integrated, aberration-free spectrograph. It is designed for fast set up of experiments.

Konica Minolta released in September the CM-25cG spectrophotometer and CM-M6 multi-angle spectrophotometer, specifically designed for the automotive industry. Designed for measurements of automotive interiors, the CM-25cG measures color and gloss simultaneously. The CM-M6 is designed for measuring vehicles' exterior finishes.

In October, **Bio-Rad Laboratories** released the KnowItAll 2017 spectroscopy software and databases, which includes an additional 976,000 reference spectra, bringing the collection to over 2.3 million spectra.

Thermo Fisher Scientific introduced in October the v 1.6 software update for its Raman spectroscopy–based Thermo Scientific TruNarc handheld narcotics analyzer, featuring an updated library to detect W-18, a designer drug, as well as other drugs, bringing the onboard library to nearly 300 suspected narcotics and narcotics precursors.

In October, **Bruker** introduced v 3.1 of its Wine-Profiling module for the NMR FoodScreener platform. The new release provides improved coverage of white wines and is based on 19,000 reference samples.

Molecular Devices launched in October the SpectraMax QuickDrop Micro-Volume Spectrophotomer for DNA, RNA, and protein quantitation and qualification with one touch. It works with sample volumes as small as 0.5 µL and has a four-second read time.

In October, **CEM** released the ORACLE Fat Analyzer, an NMR system that requires no method development and can analyze fat in any unknown food sample. Its technology completely isolates the detection of the proton signal in fat molecules from all other compositional proton sources. Measurement time is 30 seconds.

FOSS introduced in October the CombiFoss 7 for raw-milk testing. It features an advanced form of somatic cell count analysis, differential somatic cell count, for better management of Mastitis in diary cattle. It can measure up to 16 parameters of a single sample in 6 sec.

In November, Renishaw released the RA802 Pharmaceutical Analyzer, a compact benchtop Raman imaging system exclusively designed for the pharmaceutical industry for formulation analysis. It features LiveTrack focus tracking technology for users to analyze samples with uneven, curved or rough surfaces at fast speeds without sample preparation.

Cell-Based Analysis

Company Announcements

In October, **Molecular Devices**, a Danaher company, announced that the **European Patent Office** upheld its European Patent No. 1802752 (Parallel Patch Clamp System) in its original form, following a recent Opposition Proceeding. The Patent's claims are directed to systems and methods of making high-throughput electrophysiological measurements. The decision is open to appeal.

SCIENION announced in October that a French subsidiary, **Cellenion**, opened in May. Cellenion is focused on controlled cell dispensing technologies in the field of bioprinting and single-cell dispensing.

In October, **BIOKÉ**, a **Cell Signaling Technology Europe** company, announced it will exclusively distribute ACEA Biosciences' NovoCyte flow cytometer in Benelux countries.

In November, **Berkeley Lights** (BLI) announced a two-year strategic collaboration agreement with Roche, which will leverage BLI's opto-nanofluidic systems and devices to increase therapeutic discovery. The collaboration focuses on the innovation and automation of Roche's antibody discovery technology using BLI's platform.

Fluxion Biosciences announced in November that its IonFlux automated patch clamp family, previously distributed by **Molecular Devices**, will now be sold exclusively by Fluxion and its partners.

Product Introductions

In September, **Greiner Bio-One** and **EMBL** announced the development of the CELLview slide for live-cell imaging. It includes round/conical wells that provide a reduction in the impact of the meniscus effect and the ability to use multichannel pipettes.

TTP Labtech launched in September the sol-R microplates, which are designed to enhance the productivity and performance of its laser scanning fluorescence cytometers for muiltiplexed, no-wash immunoassay and phenotypic applications.

BERTIN launched in September the InCellis cell imager, featuring brightfield, phase contrast and fluorescence microscopy. All images can be processed either with the embedded apps or exported to other software.

In October, **ACEA Biosciences** launched the addition of a 561 nm laser to its NovoCyte cytometers. The two NovoCyte yellow laser systems (NovoCyte 3000 VYB and 3000 RYB) give customers the ability to excite yellow and green fluorophores of conjugated antibodies.

GE Healthcare Life Sciences released in October new IN Cell imaging systems software for high-content analysis. It is designed to minimize user input and eliminate the need for complex pre- and post-image processing of cell image data. It is built on GE's Predix software platform.

In November, **Fluxion Biosciences** launched the IonFlux Mercury, its second generation IonFlux automated patch clamp family of products. New features include extended recording times and integrated current clamp. The IonFlux Mercury replaces the IonFlux 16, and the IonFlux Mercury HT replaces the IonFlux HT.

Fluidigm introduced in November a modular set of high parameter Maxpar mass cytometry panels for immune-oncology research, designed for use with the Helios and CyTOF systems. They enable researchers to simultaneously profile T cell subpopulations across 34 markers to identify all major T cell subsets, measure checkpoint molecular expression, identify activation states and determine homing status. Options include modular panel sets and customized markers.

In November, **Merck KGaA** introduced the CellASIC ONIX2 Microfluidic System for advanced live-cell imaging. Used with lab microscopes, the next generation system allows precise control and manipulation of cell culture environments.

Reported Financial Results

$US	Period	Ended	Sales	Chg.	Op. Prof.	Chg.	Net Prof.	Chg.
AMETEK (Electronic Instruments)	Q3	30-Sep	$579.3	-3.2%	$142.7	-12.2%	NA	NA
Becton, Dickinson (Life Sciences)	Q4	30-Sep	$996.0	2.0%	$189.0	-17.5%	NA	NA
Becton, Dickinson (Life Sciences)	FYE	30-Sep	$3,829.0	0.2%	$793.0	-5.5%	NA	NA
Cepheid	Q3	30-Sep	$158.5	25.3%	($5.7)	70.6%	($10.9)	52.4%
Datacolor AG	FYE	30-Sep	$69.3	3.8%	$6.2	43.4%	$6.0	90.9%
FLIR Systems (Detection)	Q3	30-Sep	$26.4	2.3%	$6.6	25.5%	NA	NA
IDEX (Health & Science Technologies)	Q3	30-Sep	$183.5	-0.7%	$37.2	-3.0%	NA	NA
Meridian Bioscience (Life Science)	Q4	30-Sep	$12.1	-1.5%	$1.9	-34.4%	NA	NA
Meridian Bioscience (Life Science)	FYE	30-Sep	$51.0	4.6%	$13.0	7.8%	NA	NA
NanoString Technologies	Q3	30-Sep	$23.9	52.5%	($8.5)	-0.3%	($10.1)	-6.6%
Simulations Plus	Q4	31-Aug	$3.9	4.3%	$1.0	28.4%	$0.8	60.7%
Simulations Plus	FYE	31-Aug	$20.0	9.1%	$7.2	23.5%	$5.0	28.8%
Teledyne Tech. (Instrumentation)	Q3	2-Oct	$208.3	-14.4%	$28.1	-27.2%	NA	NA
Transgenomic	Q3	30-Sep	$0.5	38.5%	($1.6)	28.3%	($1.9)	73.6%
Wafergen Bio-systems	Q3	30-Sep	$2.4	19.1%	($3.6)	NM	($3.7)	NM
Xylem (Water Infrastructure)	Q3	30-Sep	$554.0	0.5%	$79.0	-4.8%	NA	NA
Other Currencies								
Biotage	Q3	30-Sep	SEK 167.0	11.6%	SEK 27.2	43.5%	SEK 27.7	51.6%
GL Sciences	Q2	30-Sep	¥5,113.9	12.5%	¥453.2	206.6%	¥320.5	212.3%
Halma	6 Mo.	1-Oct	£442.1	16.5%	£70.2	5.3%	£52.2	4.0%
Halma (Environmental & Analysis)	6 Mo.	1-Oct	£98.8	13.2%	£11.7	-7.6%	NA	NA
JEOL	Q2	30-Sep	¥25,363.0	-10.5%	¥531.0	-73.0%	-¥342.0	NM
Olympus (Scientific Solutions)	Q2	30-Sep	¥21,790.0	-15.3%	¥748.0	-70.8%	NA	NA
Precision Systems Science	Q1	30-Sep	¥782	-25.8%	-¥172	-11.6%	-¥179	1.7%

NA = Not Available, NM = Not Meaningful

Thermo Targets Cell Reagents

Carlsbad, CA 11/29/16—Thermo Fisher Scientific has agreed to acquire MTI-GlobalStem for an undisclosed amount. MTI-GlobalStem develops and commercializes technology and reagents for applications in cell transfection, neurobiology and stem cell research. “The addition of MTI-GlobalStem’s technology further strengthens Thermo Fisher’s leadership in biosciences, and provides scientists around the world with access to a wider array of advanced research products designed to help accelerate discovery using cell models,” stated Amy Butler, vice president and general manager of Cell Biology at Thermo Fisher. MTI-GlobalStem will join Thermo Fisher’s Life Sciences Solutions

segment.

The acquisition adds to Thermo's transfection and stem cell reagent offerings. In addition, it brings to Thermo additional expertise in R&D for primary and iPSC-derived cells and related products, as well as an extension of Thermo Fisher's cell product line to include primary neural cells.

MTS Investigates Its Chinese Operations

Eden Prairie, MN 11/29/16—MTS Systems, a provider of sensor and test systems for determining materials' mechanical behavior, has announced an internal investigation, which will delay the release of its fiscal fourth quarter and fiscal 2016 earnings results and Annual Report. The company is investigating alleged violation of its code of conduct by certain employees in China. "Regarding the internal investigation that has delayed the filing of our Annual Report and earnings release, we are deeply disappointed to report that we recently discovered that certain individuals in our leadership in China appear to have violated MTS's code of conduct, including association with an independent business that may compete with MTS in certain markets," said MTS President and CEO Dr. Jeffrey Graves. An independent external counsel is also conducting an investigation, and MTS stated it has already taken remedial measures to address the situation.

*The company estimated preliminary fiscal 2016 revenues of $645–$650 million, compared to $564 million in fiscal 2015. MTS was previously the subject of a US government investigation and settlement related to US government contracts and exports (see **IBO** 11/30/12). MTS's Test business provides physical testing instrumentation.*
