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Contract Testing Labs Recover Revenues

	Latest FY Rev. (M)	% Chg.
ALS	AUD 1,272.3	2.7%
ALS Life Sciences	AUD 641.6	1.3%
Eurofins	€ 1,950.1	38.3%
SGS	CHF 5,985	6.0%
Agricultural, Food & Life	CHF 934.9	6.1%
Environment, Health & Safety	CHF 464.3	23.6%

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After a difficult 2015 due to weaknesses in oil, gas and mineral markets, three publicly held contract testing lab companies bounced back in 2016. Through acquisitions, divestments, investments in startups, collaborations and division restructuring, contract testing labs ALS, Eurofins and SGS all saw increases in revenue last year, especially in environmental, food and agriculture testing segments.

Contract testing labs have a worldwide presence and broad testing capabilities, making them a significant customer base for analytical instrumentation and lab product companies. Whether it be acquisitions and consolidations or company reorganizations and structural changes, the activities of contract testing labs have a noteworthy impact on the purchase, use and application of analytical instruments and lab products.

Eurofins

Luxembourg-based contract testing firm Eurofins provides testing for numerous industries, including the agriculture, biopharmaceutical, clinical diagnostic, environment, food and genomic markets, with 310 labs in 39 countries and a diverse portfolio of over 130,000 analytical methods. In FY16, the company brought in revenues of €2,536.6 million ($2,897.1 million = €0.87 = $1), a 30.1% increase, of which over 9% was organic, the company's highest organic growth since the 2008 recession. Adjusted net profits jumped 35.2% to €227.5 million ($259.8 million), and adjusted EBIT increased 35.5% to €357.6 million ($408.4 million).

Capital expenditures for FY16 were €194.1 million ($221.7 milion), an 18.5% increase, although capital expenditure as a percentage of sales decreased 70 basis points to 7.7%, reflecting the company's goal of managing capital expenditures closer to 6% of sales by 2020. Capital expenditures include an additional 46,000 m^2 (495,139.88 ft^2) in state-of-the-art lab expansions, the establishment of 22 new startup labs and the development and implementation of IT services.

By region, North America sales topped revenues, with the company earning €803.6 million ($917.8 million) in the region, a 24.9% increase. North America comprises the largest market for Eurofins, representing 32% of revenues. France, the second largest market, soared 69.3% to €625.9 ($714.8), accounting for 25% of revenues. Eurofins' third largest market, Germany, grew 11.6% to €279.4 million ($319.1 million) and represented 11% of total revenues. Eurofins is continuing to expand company operations in emerging markets and in Asia Pacific, the latter which accounted for €342.1 million ($390.7 million) of revenues, a 27.1% increase.

Acquisitions and Startups

Revenue growth was largely driven by acquisitions, as Eurofins purchased 27 companies with total annualized revenues of over €220 million ($251.3 million). Notable acquisitions include Netherlands-based Sinensis Life Sciences, a pharmaceutical testing and cGMP QC services company; French environmental clinical testing and hospital hygiene company Biotech-Germande; ams Laboratories and Advantar, both analytical and cGMP QC service companies in Australia and the US, respectively; PerkinElmer Labs/NTD, a reference lab in the US for first and second trimester prenatal screening; EAC Corporation, part of Asahi Industries of Japan, a water and dioxin testing

firm; Megalab, a Spanish clinical diagnostic lab; and ASL Análises Ambientais, an environmental testing service provider in Brazil.

As part of its 2014 multiyear startup lab investment program, Eurofins launched 22 startup labs in FY16. Startups, including businesses in the process of restructuring or reorganizing, delivered €282.3 million ($322/4 million), down 11.2%, accounting for 11.1% of total revenues. Including the new labs from FY16's startup investments, the startup program generated 101% growth in revenue in FY16, causing the company to accelerate its startup initiative, aiming to open 76 startup labs by the end of 2017. This would total 110 labs launched by Eurofins between 2007 and 2017.

Infrastructure

Between 2005 and 2016, Eurofins added or upgraded over 380,000 m^2 (4,090,286 ft^2) in lab infrastructure. The company plans to add 17,200 m^2 (185139 ft^2) to its lab campus in Lancaster, UK, which is already the world's largest independent single-site lab, by the end of 2018, with plans to complete 1,600 m^2 (17,222 ft^2) by the end of this year.

In Asia Pacific, the company plans to expand lab space in China, Australia and Singapore by the end of 2017. Eurofins also aims to consolidate small sites into larger industrialized sites or move certain businesses to larger campuses to maximize efficiency. In Hamburg, Benelux and Sweden, site consolidation is expected to reach completion by 2019.

SGS

Swiss contract testing lab SGS has over 2,000 offices and labs globally, and provides core services for inspection, testing, certification and verification. In 2016, total company revenues increased 6.0% in constant currency to CHF 6.0 billion ($6.5 billion = CHF 0.92 = $1), which includes 2.5% organic growth and 3.5% in acquisition contributions. Adjusted operating income margin dropped 5 basis points to CHF 15.4 million ($16.6 million). SGS provides services for numerous industries, including life science, agriculture and food, energy, chemical, mining, and oil and gas.

Environment, Health and Safety

The Environment, Health and Safety (EHS) division showed the fastest revenue growth at SGS in 2016, increasing 23.6%, 6.9% organically, to account for CHF 464.3 million ($501.2 million). Growth was mostly driven by the increase in environmental testing services in North America, as well as a spike in health and safety contracts, especially in Europe. Trends in the Brazilian, Chinese and Taiwanese dioxins market also contributed to growth in the division.

Sales for high-volume and high-margin laboratory contracts were particularly strong in Europe, especially in Italy, Germany and Benelux countries, and were driven by health and safety contracts in the hospitality and real estate sectors. Demand for testing services was propelled by China and Taiwan due to an increase in the establishment of environmental laws. South America had growth in the high single digits, particularly because of the growing dioxins market in Brazil, as well as 2015 acquisitions, which performed as the company expected. A decrease in business opportunities in the oil and mining sectors hindered SGS' growth in Australia.

SGS made two significant acquisitions in the EHS division: Canadian trace analysis company AXYS Analytical Services and the acquisition of assets of environmental testing firm Accutest Laboratories. These acquisitions enhanced the company's service portfolio in North America, largely driving growth in the region. Adjusted operating margin for EHS decreased one percentage point to 11.8% due to a temporary margin dilutive effect from the Accutest acquisition.

Agriculture, Food and Life

As part of SGS' structural reorganization changes, effective January 2016, the Life Sciences Services and Food Testing segments were incorporated into Agricultural Services. The company's Agriculture, Food and Life (AFL) services revenue increased 6.1%, 4.5% organically, to CHF 934.9 million ($1.0 billion), with the Life, Food and Trade

division offsetting the slow growing agricultural market that was adversely affecting demand for contract research services.

The division made six acquisitions or strategic partnerships in 2016, including the purchase of Portugal food DNA sequencing company Biopremier, and Moroccan food and hospitality testing firm Laagrima, as well acquiring a 75% share in Brazilian precision farming company Uniego Agricultura de Precisâo, and the assets and license of official USDA inspection agency John R. McCrea Agency. North America drove certification services, while demand for testing services sales increased in Asia.

Due to weather and less-than-ideal crop quality in Europe, growth in commodity services decreased in the first half of 2016, especially during historical peak periods. Weather was also a factor in diminished Seed and Crop activities in Southern Africa.

Adjusted operating margin for AFL decreased 3.7% to 15.7% due to challenges in the agriculture market and SGS' recent acquisition investments.

ALS

ALS provides testing services for 18 industries, including agriculture, environmental, pharmaceutical, water and food. The Australia-based company has 370 sites in 65 countries, and has 4 major segments: Life Sciences, Industrial, Commodities (containing Minerals and Coal), and Oil and Gas (formerly Energy). In February, just before the end of FY17, ALS announced the appointment of Raj Naran as the company's next CEO and managing director, succeeding Greg Kilmister, who is expected to retire this month.

In FY17, revenues increased 2.7% to AUD 1,272.3 million ($977.5 million = AUD 1.30 = $1). Underlying net profits also grew 4.0% to AUD 112.7 million ($86.6 million), partially due to acquisitions and restructuring costs of $11.0 million, a 52.8% increase. The company invested AUD 106 million ($81.4 million) into 11 acquisitions in the food, tribology, and environmental and water segments, although the vast majority of these acquisitions were completed in the latter half of FY17 and do not have much of an impact on reported FY17 results.

All ALS business segments had positive growth in FY17, except lab services for Oil and Gas, which dropped 40.3% to AUD 10.8 million ($8.3 million), accounting for 1% of sales. During FY17, ALS divested the majority of its Oil and Gas assets due to a reduction in exploration and production in the sector, but retained the lab services segment. Life Sciences contributed AUD 641.6 million ($493.0 million) to revenues, a 1.3% increase, while commodities was the fastest growing segment at 6.3%, representing AUD 427.2 million ($328.2 million). Industrial accounted for $192.7 million ($148.1 million), a 3.8% increase.

ALS Life Sciences

The Life Sciences division focuses on analytical testing and sampling services for the environmental, food, pharmaceutical and consumer product markets, and although the division's revenue increased 1.3% in FY17, the growth was below company expectations as it was virtually the same as FY16 (see ***IBO*** 7/15/16). The Environmental segment brought in revenue of AUD $522 million ($401.1 million), an 11% increase, with growth in all regions except North and South America. The segment's margin improved 10.4%, 3.5% and 2.4% in Asia, Australia and Europe, respectively. The company continued to underperform in Canada and South America due to weak resource industries (i.e., mining, oil and gas) and internal management concerns, although the company indicated that organizational changes and new business initiative outside of resource industries will help margin improvement during the next year.

The Food and Pharmaceutical division had significant growth in all regions and has a current pro forma run rate of AUD 154 million ($118.3 million), including acquisitions. FY17 food testing acquisitions included European firms ALcontrol UK and BioCity, which is the food microbiology lab of the 2 Sisters Food Group in the UK. The acquisition of South American microbiology and quality control lab EMICAL in Colombia and biological and chemical testing firm TECAM in Brazil were also completed in FY17, as part of ALS' food testing lab expansion strategy in the region. The company plans to complete more food testing acquisitions in this sector as part of its business strategy, with the aim of procuring revenues of $200 million in FY18.

R&D Spotlight: Hamilton

An established, privately held provider of laboratory automation and measurement systems and aftermarket products, Hamilton is built on innovation and product development. The company participates in multiple end-markets, serving a wide range of customers. Established in 1953 and family owned, the company has more than 1,300 employees.

Hamilton consists of five businesses. Hamilton Robotics provides liquid handling and lab automation solutions. Hamilton Storage is supplier of temperature-controlled sample management systems. Hamilton Laboratory Products, the company's founding business, supplies laboratory syringes, as well as other instrument accessories and consumables. The Process Analytics business provides process measurement solutions, while the company's OEM Solutions unit supplies many of these products. Hamilton Medical provides ventilation systems for medical care.

> ***"[F]or the most part, [R&D] is driven through the marketing side of the business, looking at what customers are asking for and where we see gaps in the market."***

Hamilton Robotics conducts both dedicated internal product development as well as product development via collaboration. Either way, R&D is market driven, according Debbie Bowers, vice president of Robotic Operations at *Hamilton*. "[F]or the most part, [R&D] is driven through the marketing side of the business, looking at what customers are asking for and where we see gaps in the market," she said.

An example is Hamilton Robotics' [MPE]2 device for automated positive pressure extraction and evaporation on a liquid handling workstation. "What we saw was that when customers wanted to do solid phase extraction, their preference was positive pressure, but the reality was that there weren't automated solutions for positive-pressure extraction. Scientists were mostly using either centrifugation, or they were going with vacuum extraction, vacuum filtration," Ms. Bowers explained. "There are some disadvantages of those two options in automating extraction protocols," she said.

R&D is conducted at Hamilton's facilities in Reno, Nevada, and Bonaduz, Switzerland. "For each of those locations, we have dedicated, focused areas with PhDs that are interacting with the market," noted Ms. Bowers. "This includes looking at where that market is going 3–5 years from now, and what technologies are going to advance that market 3–5 years from now. And we need to start working at them now so that when solutions are available in the future, those solutions are available on Hamilton automation."

The sites, which have about the same number of R&D personnel, also develop products together, according to Ms. Bowers. "There are projects where Reno and Bonaduz are both involved, so that the combined solution is in fact a globally developed solution." Where expertise can be shared between all of the Hamilton businesses, for example, in firmware and industrial design, it is.

> ***"[W]hen we say, 'now we're going to develop this technology or this product or this enhancement,' really, first and foremost, is that it's seen as value added for the customer, and that it is truly innovative."***

Ms. Bowers told ***IBO*** that Hamilton's R&D philosophy prioritizes innovation over cost. "[W]hen we say, 'Now we're going to develop this technology or this product or this enhancement,' really, first and foremost, it's seen as value added for the customer, and that it is truly innovative."

Taking advantage of its manufacturing capabilities, the company can develop new products and sell them at market prices as economies of scale reduce cost. "Manufacturing is a core competency of ours, and we are very vertically integrated, so we're constantly fine-tuning and trying to reduce the cost of the products we're manufacturing, and

then we pass that savings on to our customers," said Ms. Bowers. She emphasized, "But we don't view development with cost reduction in mind. We typically do development with innovation in mind."

As a lab automation company, Hamilton Robotics collaborates closely with both end-users for customized solutions and with other vendors for the automation of their products. Collaborations address both platforms and applications, and involve joint R&D. "We have many collaborators in a number of industries," noted Ms. Bowers. "We put together a project focus and then we start identifying teams on both sides to come up with an application or a platform, even one that's dedicated to an application, that then enables them to talk about their science at either higher throughputs with more walkaway time, or with a robustness or a kit that's been designed for automation from the beginning."

With companies, Hamilton Robotics works to automate chemistries, as in the case of Zymo Research (see ***IBO*** 5/31/17) and New England Biolabs, and with instrument providers, as in the case of Illumina, to create automated workflows. According to Ms. Bowers, "We also consider collaborations where we are ideally suited to contribute towards a fully automated system solution, known as a standard solution." An example is Illumina's VeriSeq NIPT Microlab STAR, which automates sample preparation for Illumina's NIPT NGS-based solution."Illumina chose Hamilton because of our strong track record of success and our ability to globally support the solution," she said.

Such collaborations also contribute to Hamilton's own product development. "That does address some of the R&D because, from that R&D, if it's the 3 or 4 custom pieces or parts; guess what, those custom pieces or parts become larger volume. They then become standard parts," said Ms. Bowers. "It's a novel idea, and it's not like our partners want to go out and sell a tube carrier or a plate carrier or an incubator. They just want their applications to run," she explained. "That's the beauty of it: Hamilton is excellent at hardware and software. We're excellent at precise liquid handling [and] at manipulation of labware, but our partners are experts on their respective protocols, and so if you put the two together, you marry the two sides."

> ***"We try to be as agnostic as we can be. In being that way, it allows us to see all kinds of scientific disciplines that some companies don't have the opportunity to look at."***

R&D and marketing collaborations with other companies offer other benefits. Because Hamilton Robotics works with multiple chemistry companies, and it is not in the chemistry business, it benefits from exposure to multiple technologies. As Ms. Bowers said, "We try to be as agnostic as we can be. In being that way, it allows us to see all kinds of scientific disciplines that some companies don't have the opportunity to look at."

An example is Hamilton Robotics' ELISA NIMBUS system for automating ELISA testing workflows, an open platform for use with most vendors' ELISA kits. "I think that's a huge value to the customer because then they have the ability to now work with whatever technology comes out as a better technology. Because, let's face it, in science, it's a constant discovery and there's always going to be something better that comes out."

Likewise, R&D collaborations also include working with customers on customized products. These solutions also contribute to development of Hamilton Robotics' own products. "As an example, we had a customer with a specific tube configuration. If the tube rotated, there was a risk that the barcode on the tube could move out of view of the automated barcode reader installed on our automation platforms," explained Ms. Bowers. "To address the issue, we created a keyed tube insert so that the tube fit snugly in the carrier without rotating."

nitially we built a rapid prototype of this on one of our many 3D printers. Once the prototype was successfully confirmed, we built machined parts in small quantities. Then as demand grew, we moved production of this keyed tube insert onto our fully automated production floor to increase the production volume," explained Ms. Bowers. "Ultimately, the market was so interested in this solution that we invested in making the product as an injection molded part," she continued. "Designing a solution, ensuring it addresses the customer need, testing the market demand and then scaling the solution to address market demand is the foundation of our manufacturing efficiencies."

Asked about changes in recent years to its R&D process, Ms. Bowers highlighted beta testing. "Hamilton has done a ton of product development and product launches, but it didn't have a formal beta process. Now, when we're going to market with full platforms, or even devices—we've done it with our plate sealer as well—we collect customer data and do enhancements, and then we launch the product," she said. This involved learning to limit beta testing and focus on what data to collect. "That process has been a learning curve for the sales team as well as the product

management team. And even R&D."

Summing up Hamilton's R&D approach, Ms. Bowers said, "[It is looking at] gaps in the market, customer requests, collaboration [and] research from our own internal team pitching us technologies. Then [we address] that technology towards a customer request, collaborative request or gap in the market that we see."

Double-digit R&D Growth in FY16

Total R&D spending for 17 publicly held analytical instrument and laboratory product companies leaped 12.9% in fiscal 2016 to $2,776 million (FY17 results for included for Oxford Instruments, whose fiscal year ended March 31 (see Financial). The increase in R&D spending reflects the companies' cumulative 12.2% jump in FY16 revenues to $41,009 million, as well as continued investment in clinical markets and sequencing technology.

Although revenue and R&D spending growth showed big gains, the cumulative percentage of sales devoted to R&D for the companies in the table remained roughly the same at nearly 7%. But median annual R&D expenditure per revenues for the companies was 9.8% versus 6.4% in FY15.

		FY14			FY15			FY16		
	Company	Sales ($M)	R&D ($M)	%	Sales ($M)	R&D ($M)	%	Sales ($M)	R&D ($M)	%
Sales >$500M	Thermo Fisher Scientific	$16,889.6	$691.1	4.1%	$16,965.4	$692.3	4.1%	$18,274.1	$754.8	4.1%
	Agilent Technologies	$4,048.0	$358.0	8.8%	$4,038.0	$330.0	8.2%	$4,202.0	$329.0	7.8%
	Merck KGaA (Life Science)	$2,980.6	$180.7	6.1%	$3,728.1	$219.4	5.9%	$6,286.6	$288.9	4.6%
	PerkinElmer	$2,069.9	$108.1	5.2%	$2,104.8	$112.5	5.3%	$2,115.5	$124.3	5.9%
	Waters	$1,989.3	$107.7	5.4%	$2,042.3	$118.5	5.8%	$2,167.4	$125.2	5.8%
	Illumina	$1,861.4	$388.1	20.8%	$2,219.8	$401.5	18.1%	$2,398.4	$504.4	21.0%
	Bruker	$1,808.9	$174.2	9.6%	$1,623.8	$145.7	9.0%	$1,611.3	$145.7	9.0%
	QIAGEN	$1,344.8	$163.6	12.2%	$1,281.0	$147.2	11.5%	$1,338.0	$176.1	13.2%
	Eppendorf	$590.1	$32.6	5.5%	$699.0	$35.5	5.1%	$723.9	$38.7	5.3%
	Total Large	**$33,582.5**	**$2,204.1**	**6.6%**	**$34,702.2**	**$2,202.6**	**6.3%**	**$39,117.2**	**$2,487.1**	**6.4%**
Sales < $500M	Oxford Instruments	$493.6	$39.6	8.0%	$469.6	$30.6	6.5%	$452.6	$36.1	8.0%
	Tecan	$443.9	$43.8	9.9%	$489.2	$44.3	9.1%	$562.5	$52.3	9.3%
	Bio-Techne	$357.8	$30.9	8.6%	$452.2	$40.9	9.0%	$499.0	$45.2	9.1%
	Fluidigm	$116.5	$43.4	37.3%	$114.7	$39.3	34.3%	$104.4	$38.4	36.8%
	Harvard Bioscience	$108.7	$4.9	4.5%	$108.7	$6.4	5.9%	$104.5	$5.4	5.2%
	Biotage	$57.3	$4.5	7.8%	$71.3	$5.8	8.1%	$78.0	$5.7	7.4%
	Pacific Biosciences	$60.6	$48.2	79.6%	$92.8	$60.4	65.1%	$90.7	$67.6	74.5%
	NanoString Technologies	$47.6	$21.4	45.0%	$62.7	$24.6	39.3%	$86.5	$34.7	40.1%
	Total Small	**$1,192.3**	**$197.2**	**16.5%**	**$1,391.6**	**$221.7**	**15.9%**	**$1,525.8**	**$249.4**	**16.3%**
	Total	**$35,268.4**	**$2,440.9**	**6.9%**	**$36,563.5**	**$2,455.0**	**6.7%**	**$41,009.0**	**$2,772.6**	**6.8%**

Click to enlarge

Although currency and acquisitions affected R&D spending, only Merck KGaA Life Science experienced a significant bump in both sales and R&D spending last fiscal year as a result of an acquisition (see ***IBO*** 11/30/15). Organically, sales grew 6.3% for the company. Thermo Fisher Scientific, Agilent Technologies, PerkinElmer and Bio-Techne also made bolt-on acquisitions during the year, adding to R&D expenses. As a percentage of manufacturing revenue, Thermo Fisher Scientic's FY16 R&D spending was 6.3%.

The figures in the table below are based on FY16 sales and R&D spending as reported in company financial and regulatory documents. Foreign company sales figures have been converted to US dollars. Companies were chosen based on the availability of R&D figures and their involvement in instrumentation markets.

Sequencing Companies Lead the Pack

Growth in R&D spending in fiscal 2016 followed a familiar pattern, as it was led by life science firms with new or rapidly growing technologies. R&D expenditures excluding acquisitions rose more than 25% for two companies, Illumina and NanoString Technologies. Similarly, the five companies with double-digit percentage increases in the

ratio of R&D to revenues are dedicated to life science technology: Fluidigm, Illumina, NanoString Technologies, Pacific Biosciences and QIAGEN. These same companies were also the only companies in the table to boast double-digit R&D-to-sales ratios in FY15. For Illumina, NanoString and QIAGEN, the investments also represent expansion of their diagnostic product lines and applications.

In particular, growth in DNA sequencing companies' R&D spending raced ahead of revenue gains. Although Illumina's FY16 sales grew 8.0%, R&D spending was up 25.6% to over $500 million. QIAGEN increased its R&D spending 19.7%, even though sales rose 4.5%. Pacific Biosciences' R&D expenditures were up 11.9%, no doubt affected by its former partnership with Roche (see ***IBO*** 12/15/16), despite a 2.2% decline in sales.

But these were not the only companies devoting more resources to R&D in FY16. In total, R&D spending increases remained ahead of revenue growth for 13 of the 17 companies in the table. Notably, PerkinElmer R&D spending rose 10.5% in the face of a 0.5% increase in sales. And Eppendorf R&D was up 9.0% compared to revenue growth of 3.6%.

PerkinElmer's increase growth in R&D follows last year's modest increase and the company's more focused R&D efforts in key areas. Addressing the R&D increase on the company's second quarter 2016 conference, Chairman, President and CEO Robert F. Friel responded, "As we have communicated previously, we are concentrating a greater portion of our growth investments in four priority areas. These areas include food quality and safety, pharma services and solutions, reproductive health, and emerging market diagnostics, and represents roughly 40% of PerkinElmer's total revenues."

Bruker's R&D increased this fiscal year following FY15's decline and company-wide changes, including expense controls. "We are using benefits of our initiatives in our restructuring actions to invest in commercial activities and R&D activities, so we're not starving the business of investment with our restructuring actions," said Bruker CFO Anthony L. Mattacchione on the company's third quarter 2016 conference call.

Also upping R&D investments last fiscal year following a decline in spending in FY15 were Oxford Instruments and QIAGEN. The FY15 drop in QIAGEN's spending followed the release of its GeneReader NGS system. QIAGEN's fiscal 2016 R&D investments included new Centers of Excellence. At its fall 2016 Analyst Day, the company disclosed that molecular diagnostics accounts for about 10% of R&D to sales. Oxford Instruments' R&D increase includes currency effects.

Larger Companies' R&D Spending

R&D spending for companies in the table with over $500 million in annual revenues rose a total of 12.7% in FY16, outpacing sales growth of 12.9%. The tight correlation of R&D spending growth to sales growth for larger companies is also evident in the table's FY15 figures, when R&D was flat and sales grew 3.3%.

Even when removing Illumina's hefty R&D spending, the large companies' R&D still rose double-digits last fiscal year, up 10.1%, with sales up 13.0%. But without Illumina, the ratio of R&D sales to revenue for larger companies dropped by more than half to 6.4%, indicating Illumina's influential share of R&D spending among these companies.

In fact, Illumina spent the most on R&D of any company in the table with the exception of Thermo Fisher Scientific. This strategy looks set to continue in line with ongoing sequencing technology and market developments. Illumina President and CEO Francis A. deSouza told analysts on the company's fourth quarter 2016 conference call, "We continue to invest a lot in R&D. And we believe there is a lot of headroom that we can invest in either to provide better, faster, cheaper sequencing and get us to that $100 genome or to provide more sample-to-answer solutions that would be enabling in applied markets and in the clinical markets."

Smaller Companies' R&D Spending

R&D spending by the eight companies in the table with revenues of less than $500 million grew 12.5% in fiscal 2016, nearly the same rate as FY15 despite sales growth. Sales for these companies increased 9.6% in FY16 versus growth of 16.7% in FY15. Two smaller companies, Biotage and Harvard Bioscience, recorded a decrease in sales as a percentage of R&D. Harvard Bioscience posted declining sales growth last year, and Biotage modulated spending

following FY15's 25.3% rise in R&D spending.

In addition to Harvard Bioscience, Biotage, Fluidigm and Oxford Instruments also decreased R&D spending last fiscal year. The decrease was in line with declining sales for both Fluidigm and Harvard Bioscience. For Fluidigm, it was the third straight year of decreased R&D spending, congruent with a drop in sales and fewer product introductions. In fiscal 2017, Oxford Instruments completed the first year of a new program to increase the company's sales, including more collaborative R&D across businesses and a focus on higher growth markets. The company's Vitality Index, which measures the percentage of sales from products introduced in the prior three years, was level at 31%.

EU Alleges Breach of Rules by Merck KGaA

Brussels 7/6/17; Darmstadt, Germany 7/6/17— In connection to Merck KGaA's acquisition of Sigma-Aldrich (see ***IBO*** 11/30/15), the European Commission (EC) has alleged that Merck failed to provide pertinent information related to the assets of its lab chemicals business, which was divested to in 2015 to Honeywell as part of the EU's conditions for the acquisition (see ***IBO*** 10/31/15). According to the EC's investigation, Merck did not provide information about an R&D project related to the divested laboratory chemicals assets and, thus, did not transfer the project to Honeywell as would have been required by the EC. The EC stated, "Had this project been correctly disclosed to the Commission, it would have had to be included in the remedy package." The EC said the project has the potential to "substantially increase" sales, and thus impacted the competitiveness of the divested businesses. Merck has since agreed to license the technology to Honeywell, but after a one year delay, and after a third party notified the EC. The EC could fine Merck up to 1% of annual sales. Merck responded that the innovation in question is packaging technology and that it is reviewing the EC's complaint. The company stated, "Merck KGaA, Darmstadt, Germany, is confident this issue will be resolved in a satisfactory manner." Merck will provide the EC with a written response.

The EC's investigation is ongoing, and the acquisition's approval will remain in place despite the outcome. Reuters reports that the companies have until the September 1 to respond. Margrethe Vestager, the European Commissioner for Competition, stated "Honeywell was the buyer of the business. It needed all the right assets to make it a viable

competitor on the market."

Agilent Enters Raman Market

Santa Clara, CA 7/7/17—Agilent Technologies, a provider of analytical lab technologies, has acquired Cobalt Light Systems for £40 million ($57 million at £0.70 = $1) in cash. Cobalt provides Raman spectroscopic systems that can identify chemicals and materials through opaque barriers and surfaces. It provides systems to the pharmaceutical, applied and public safety markets. "Raman spectroscopy is one of the fastest growing segments in spectroscopy," stated Phil Binns, vice president and general manager of Agilent's Spectroscopy and Vacuum Solutions Division. "This acquisition gives our customers access to state-of-the-art Raman spectroscopy technology. It also provides Agilent immediate entry into this fast growing segment with a highly competitive, differentiated offering." Based in the UK, Cobalt has 52 employees. Cobalt CEO Paul Loeffen has been named Agilent's Director of Raman Spectroscopy, and Cobalt will become Agilent's global center for Raman spectroscopy.

Agilent participates in other molecular spectroscopy markets: UV/Vis, IR, and florescence and luminescence spectroscopy. Among the other companies providing multiple molecular spectroscopy techniques are Bruker and Thermo Fisher Scientific. Cobalt's products include benchtop and handheld systems.

Teledyne Buys LC Pump Company

Thousand Oaks, 7/13/17—Teledyne Instruments has agreed to acquire Scientific Systems (SSI) for an undisclosed amount. Scientific Systems supplies precision components and specialized subassemblies for analytical and diagnostic instruments, such as HPLC. The company specializes in high-pressure positive-displacement piston pumps. "I have personally followed SSI for a number of years, and Teledyne has recently become one of SSI's larger customers. I have developed great respect for Andy Charney, the company, and the current management and employees of SSI," said Teledyne Chairman, President and CEO Robert Mehrabian. "SSI will provide Teledyne greater access to life sciences customers and markets, while Teledyne offers SSI additional technologies and new opportunities in the industrial space.

Teledyne Isco recently launched the ACCQPrep Hp125 HPLC system, its first dedicated HPLC instrument. For the LC market, the company also offers flash chromatography systems. Among SSI's customers are OEM companies. According to Teledyne, SSI provides pumps capable of 25,000 psi pressure and flow rates down to 1 µL. Based in Pennsylvania, SSI was founded in 1967.

BGI Goes Public

Shenzhen, China 7/14/17—BGI Genomics, a genomics service company, has completed an IPO in China on the Shenzhen Stock Exchange's Chi-Next Exchange. The IPO consisted of 40.1 million shares at CNY 13.64 ($2.01 at CNY 6.78 = $1)) per share. "This IPO is a historic day for BGI," commented BGI Genomics CEO Yin Ye. "The capital raised will allow us to invest in the development of new services, top talent and lab infrastructure to benefit our global customers and to support our continued growth and innovation."

The offering raised $250 million, according to China Money Network. In 2016, BGI revenues grew 30.8% to CNY 1.7 billion ($251 million). Net profit rose 28.7% to CNY 350 million (51.6 million). Nature reported that the company's services business accounts account for the majority of revenues, with reproductive health screening representing 55% of total revenues. Other businesses include research-based sequencing and instrumentation. The company introduced a new version of its clinical sequencing systems last year (see **IBO** *12/31/16), and has gained Chinese FDA approval for it. According to a May article in Wired, BGI plans to increasingly use its own sequencers for its services.*

KPM Analytics Makes Fourth Acquisition in Two Years

Milford, MA 7/10/17—KPM Analytics, an operating company that owns analytical instrument companies, has acquired AMS Alliance. Based in Italy, AMS supplies automated analyzers and solutions for the food and beverage, environmental and medical diagnostics markets. "AMS is a perfect fit with KPM's existing Operating Companies, Unity Scientific, Process Sensors, and CHOPIN Technologies," commented KPM Analytics CEO Chris McIntire. "We are very excited to have them now part of our portfolio. The combination of all four strong and well-regarded brands positions KPM Analytics as a key provider in the global food and beverage, and environmental instrumentation markets." AMS CEO Antonio Gagliarducci will remain with the company.

AMS develop and manufactures continuous flow analyzers and discrete analyzers, as well as kits and reagents for direct, OEM and private vendor sale. It has approximately 100 employees, according to a KPM spokesperson. She told **IBO**, *"AMS Alliance markets, sells and supports its products worldwide using direct employees and a network of distributors. Unity Scientific, another KPM Analytics operating company, has marketed AMS products in the US under the Unity Scientific brand for the past several years."*

First Quarter 2017 Results: NanoString Technologies, Oxford Instruments, Sartorius, Shimadzu and VWR

CY Q1 2016 Results								
	Revenues			Rev. Growth Summary			Adj. Operating Profit	
	($M)	% of Co. Rev.	% Growth	% Curr.	% Acq./Div.	% Org. Grow.	($M)	% Growth
NanoString Technologies	$18.1	100%	22.9%	NA	0%	NA	-$17.5	-31.4%
Oxford Instruments	£348.5	100%	9.0%	12.7%	NA	-3.7%	£42.5	3.2%
Sartorius (Lab Products & Services)	€ 92.6	27%	22.7%	11.7%	11%	1.7%	€ 16.3	43.1%
Shimadzu AMI	¥209,321.0	61%	0.4%	-5.9%	NA	6.3%	¥33,052.0	0.3%
VWR	$1,139.1	100%	3.7%	-1.7%	1.1%	4.3%	$81.5	7.2%

Solid First Quarter for NanoString

NanoString Technologies posted a strong first quarter, with total revenue of $18.1 million, a 22.9% increase. Collaboration revenue fell 10.3% to $2.3 million and accounted for 12.7% of total revenues. Sales for Product and Service jumped almost 30% to $15.8 million, largely due to the launch of several nCounter products in March (see ***IBO*** 3/31/17). Eighty percent of its new systems were sold for precision oncology. The healthy increase in product and service was driven by the strength of biopharma and diagnostics markets, which grew 40% and 90%, respectively, for the company.

Instrument sales grew 31.4% to $4.5 million due to the robust biopharma sector, as NanoString's installed base increased to an estimated 510 nCounter Analysis systems, surpassing the company's goal of installing 500 systems for the year. The nCounter SPRINT Profiler systems accounted for approximately half of all instrument units sold, with academia leading demand. Excluding the Prosigna breast cancer assay, consumables revenue jumped 19.2% to $8.6 million, accounting for 47.5% of revenues. Growth was driven by the company's panel products, which represented over 50% of life science consumables sales, and an increase in the installed base of instruments, with biopharma and CROs accounting for over 40% of consumables revenue.

NanoString Technologies Q1 FY17			
	Rev. ($M)	% Rev. Grw.	% of Rev.
Instruments	$4.5	31.4%	24.9%
Consumables	$8.6	19.2%	47.5%
In Vitro Diagnostics	$1.3	90.8%	7.2%
Service	$1.3	63.7%	7.2%
Collaborations	$2.3	-10.3%	12.7%

Click to enlarge

Sales in Asia Pacific slipped 18.4% to $1.4 million, while sales in EMEA jumped 54.7% to $4.4 million, accounting for 7.7% and 24.3% of sales, respectively. Sales in the Americas climbed 21.1%, with US sales representing $11.8 million of total revenue.

NanoString maintained its 2017 revenue guidance of $100–$105 million, which includes a gross margin on product and service between 57% and 58%. The company stated in its conference call that its main objective for this year is the optimization of its commercial capabilities, including new sales staff and advanced marketing tools. For the second quarter, NanoString expects total revenue between $23.5 million and $24.5 million, which includes $18.5–$19.5 million in Product and Service revenue, and approximately $5 million in Collaboration revenue.

Sartorius Lab Products and Services Sales Grow Double Digits

Sartorius first quarter sales grew 13.6%, 12.2% in constant currency, to €343.1 million ($365.0 million). Lab Products & Services (LPS) revenue rose 22.7%, 21.0% in constant currency, to account for 27% of revenues. Acquisitions contributed 11% growth to LPS sales. Orders increased 21.4% in constant currency to €93.4 million ($99.4 million) LPS sales grew in all regions, led by EMEA. Adjusted operating income increased 43.1% to €16.3 million ($17.3 million). LPS constant currency sales growth outlook for 2016 was unchanged at 20%–24%, with organic growth at the midpoint of 5%. EBITDA expected to increase two percentage points to 16.0%,

Bumpy Year for Oxford Instruments

For the fiscal year ending March 31, Oxford Instruments sales increased 9.0%, down 3.7% in constant currency, to £348.5 million ($452.6 million = £0.77 = $1). Orders grew 12.1% organically but fell 7.3% in constant currency due to the Industrial Analysis and OI Healthcare businesses. Adjusted operating income rose 3.2% to £42.5 million ($55.2 million). Adjusted operating margin declined 70 basis points to 12.2%.

In constant currency, Asian sales jumped 7.2%, but European and North American sales declined 5.9% and 12.0%, respectively.

Nanotechnology Tools (NT) (NanoCharacterization and NanoSolutions) revenues declined organically, but demand in the nanotechnology market was strong, led by next generation batteries and biomedical imaging applications. The academic and metal markets continued to be restrained. Product highlights included robust sales of the XMax Extreme SDD and Imaris analysis software.

Oxford Instruments FY17			
	Rev. (£M)	% Rev. Growth	Constant Currency Growth
Nanotech. Tools	208.6	11.4%	-1.2%
Industrial Products	56.7	5.0%	-7.0%
Service	83.2	6.1%	-7.1%

Click to enlarge

Asylum Research revenue declined as slower academic funding and product delays affected sales. In the NanoSolutions business, magnet sales and demand related to quantum-related technologies fueled sales. NT adjusted operating profit rose 20.2% to £25.6 million ($33.2 million) as adjusted operating margin expanded 90 basis points to 12.3% due to operational changes and higher-margin products.

Sales for the Industrial Products (IP) segment (X-ray Technology, Magnetic Resonance, Industrial Analysis [divested in April (see ***IBO*** 4/30/17)]) also declined on an organic basis. IP adjusted operating margin increased 54.5% to £1.7 million ($2.2 million). Adjusted operating margin rose 100 basis points to 3.0%. Curtailed demand in the oil, commodity and steel markets impacted sales.

Service (general service, OI Healthcare) revenue declined organically as revenue fell for the OI Healthcare business due to a system manufacturer's revised software licensing policy, which reduced the sale of refurbished systems.

Shimadzu FY17 Sales Boosted by LC and MS

For the year ending March 31, revenue for Shimadzu's Analytical and Measuring Instrument (AMI) business rose 0.4% to ¥209.3 billion ($1,931.5 million at ¥108.36 = $1), or 61% of company sales. Operating income increased 0.3% to ¥33.1 billion ($305.5 million). Operating margin declined 191 basis points at 15.8%. On a currency neutral basis, AMI sales grew around 6.3%, and operating profit was up 13.4%.

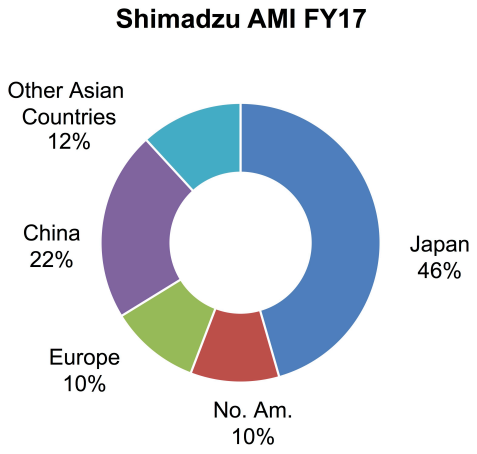
Total FY17 AMI Instrument sales grew 0.1% and were up 6.5% excluding currency. AMI Aftermarket sales grew 1.3% on a reported basis and, excluding currency effects, rose 5.9% to make up 28% of segment sales, up three-tenths of a percentage point.

Shimadzu Analytical & Measuring Instr. FY17			
	Revenue (¥B)	% Revenue Growth	% Rev. Growth Excl. Currency
LC	¥56.6	1.7%	9.60%
MS	¥33.9	2.9%	10.80%
GC	¥20.3	-0.2%	6.30%
Other	¥98.4	-1.0%	3.10%

Click to enlarge

AMI sales in Japan, China and Other Asia Countries rose 5.0%. Excluding currency, Chinese and Other Asian Countries sales rose 1.4% and 2.2%, respectively. AMI Sales in North America and Europe both declined 6.7%, but on a currency-neutral basis, they increased 3.4% and 4.1%, respectively.

Fiscal 2018 AMI sales are forecast to increase 15.9%, up 4.2% excluding currency, to ¥218.0 billion ($2,011.8 million). FY17 priorities for the AMI Business include LC, MS and aftermarket investments, as well as the integration of AMI and Medical Systems product lines as part of a new Healthcare Business Strategy Unit.



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Under the company's new Medium-Term Business Plan (FY16–FY19), total AMI revenue is forecast to reach ¥253.0 billion ($2,334.8 million), up 16% from FY16. Within the segment, MS sales are expected to rise 30.6% to ¥45.0 billion ($415.3 million), and LC revenue should increase 26.3% to ¥72.0 billion ($664.5 million). AMI aftermarket sales are expected to make up 30% of total sales, including additional LabSolutions capabilities, and expanded service and consumables businesses. New MS applications will include molecular diagnostics and cell analysis, while new LC applications are expected to be in the area of cell science.

VWR Continues Winning Streak

Riding high from the first quarter in 2016, VWR delivered a record first quarter this year, with net sales up 3.7%, 4.3% organically, to $1.14 billion, which were above the company's long-term expectations of 3-4% yearly organic growth. This is largely due to increasing sales in EMEA-APAC and an improvement of sales in the Americas. Currency reduced net sales growth by 1.7%, or $19.1 million, but was balanced by a 1.1% increase, or $12.5 million, in acquisitions (i.e., Seastar, EPL and MESM) (see ***IBO*** 1/15/17, 3/31/17 and 4/15/17).

Due to strong demand from industrial, health care and education customers, VWR's Americas segment grew 3.9%, 1.7% organically, to $698.2 million, with a 1.9% contribution from acquisitions. Operating margin in the Americas decreased 50 basis points to $41.9 million due to the timing of certain manufacturing orders, as well as $0.9 million in restructuring expenditures and $1.9 million in inventory changes. Sales in education, health care and industrial segments grew in the mid-single digits, while biopharma sales improved in the low single digits. By product, consumables sales grew in the low single digits, while chemicals sales increased in the high single digits. Equipment and instrument sales decreased in the low single digits due to a challenging comparison.

VWR Q1 FY17						
	Rev. ($M)	% Total	% Rev. Grw.	Curr.	Acq.	% Org.
Americas	$692.8	60.1%	3.9%	-1.7%	1.9%	1.7%
EMEA-APAC	$446.3	39.2%	3.4%	-4.8%	0.4%	8.4%

Click to enlarge

VWR's EMEA-APAC sales grew 3.4%, 8.4% organically, to $446.3 million, but were offset by currency of $20.9 million, a 4.8% decline, while recent acquisitions added $1.7 million, or 0.4% to growth. Operating margin increased 9.0% to $3.3 million and was affected by adjustments in favorable earn-out of $1.7 million and restructuring expenditures of $4.8 million, resulting in an adjusted operating margin of $49.1 million. Biopharmaceutical and government sales grew in the high single digits, while industrial sales increased double digits. Education and health

care sales climbed in the mid-single digits. Based on product, sales growth was largely driven by chemicals and other consumables, which increased at double-digit and high single-digit rates, respectively. Sales in EMEA-APAC were furthered by higher volume due to the Easter holiday as well as business trends.

Gross profit margin for VWR decreased 20 basis points to 28.1% largely due to inventory charges, adverse currency effects from cross-border purchasing and product mix. Adjusted operating margin decreased nominally to 7.2%. The company is expected to be fully acquired by Avantor in the third quarter of 2017 (see ***IBO*** 5/15/17), and will no longer provide or update financial guidance.

Vapor Pressure Analyzers

Vapor pressure refers to the force of a material's vapor phase that exists in equilibrium with its pure solid or liquid phase at a given temperature inside of a closed container. It reaches this equilibrium point when molecules are evaporated into the gas phase at the same rate as they are condensed back into a liquid or deposited as a solid. Since the kinetic energy of both phases will increase when heated, vapor pressure increases exponentially with rising temperature.

As the different intermolecular forces within different materials require different energies to come apart, this relationship between vapor pressure and temperature will vary by material. The property is usually expressed in kilopascals (kPa), but other units may be used depending on the context of the measurement, including torr, psi and atm. As an indicator of a substance's volatility, the property is often determined in a laboratory using a vapor pressure tester.

Samples commonly tested in the lab with a vapor pressure analyzer include oils, natural gases, fuels, and various volatile chemicals and solvents. Many test methods exist in order to standardize the methodology, most notably though ASTM. All commercial vapor pressure analyzers conform to one or more of these test methods.

The measurement process depends on the method, but it usually involves placing the sample in a piston chamber. When the piston is moved to expand the volume of the chamber, part of the sample volatilizes to fill the void. When equilibrium is reached, the pressure generated by the vapor is measured. The measurement can be made as a single data point for a given temperature, or it can be made as a series of data points at various temperatures.

Vapor pressure testers help to ensure that a volatile material has the correct properties for its intended use. Fuel testing is one of the most important applications, since the measurement is used to indicate how well a particular fuel will perform under various conditions, as well as ensure that it meets environmental pollution regulations.

Crude oils and fuels are also routinely tested for vapor pressure before they are transported by pipeline, oil tankers, rail or other means in order to prevent costly damage to the transportation system. In fact, customers generally require a guarantee of maximum vapor pressure before accepting a fuel delivery. The analyzers are also crucial for determining the quality of oil and petrochemicals during refinement and blending.

Major suppliers of benchtop vapor pressure analyzers include Grabner Instruments (AMETEK), PAC (Roper Technologies) and Stanhope-Seta. The leader in the market is Grabner Instruments, which offers the MINIVAP series, including a 12-position autosampler option. PAC offers the HVP 972, while Stanhope-Seta sells the SetaVap 2 and SetaVap 3 analyzers. Other suppliers include Anton Paar, Normalab, Koehler Instrument and Tanaka Scientific. The total market is currently worth about $13 million. Driven by transport regulations in the oil and gas industry, sales are projected to increase modestly in the next few years.

Vapor Pressure Analyzers at a Glance:

Largest Suppliers:

- Grabner Instruments (AMETEK)
- PAC (Roper Technologies)
- Stanhope-Seta

Largest Markets:

- Petroleum
- Natural Gas
- Fuels

Instrument Cost:

- $2,000–$15,000

Genomics

In May, a meeting for the Genome Project-write (GP-write) was held in New York City, New York. GP-write's mission is to synthesize all 23 chromosomes in the human genome and transfer these "designer" genetic codes into cells used for therapeutic drugs and for fuel. Supporters of GP-write state that the project is focused on the synthesis and assembly of high amounts of DNA as opposed to using it to create designer babies. Project members believe that the only way science can understand the complexity of the human genome is by writing it from scratch. The project is expected to create numerous opportunities for the development of new technologies and software for the design and synthesis of DNA.

Among the genomes that have already been synthesized by scientists are the genomes for poliovirus, mycoplasma genitalium, mycoplasma mycoides, Escherichia coli and yeast. Synthesizing the human genome is no small task—a human genome entails over 3 billion bases in total across 23 paired chromosomes, with the smallest chromosome containing 46.7 million bases and the largest chromosome containing 249 million bases. The estimated time to complete synthesis of a human genome is approximately 10 years. As of now, it is unclear how GP-write will be funded.

Source: *Chemical & Engineering News*

Government

Since Scott Pruitt began his position as the administrator of the EPA, he has dismantled over 30 environmental regulations and international agreements implemented by former President Barack Obama. This dismantling of so many environmental rules in such a short time frame is unprecedented for the EPA.

In February, Mr. Pruitt filed a proposal of intent to undo the Obama administration's regulations for the Clean Power Plan, and in May, he reversed a ban on the use of chlorpyrifos, a pesticide that the EPA has concluded damages the nervous system of children. In June, he filed a legal plan to repeal the previous administration's rule restricting pollution in water bodies across the US, and also delayed a rule that would require fossil fuel companies to restrain methane leaks from oil and gas wells, as well as a rule requiring chemical firms to prevent explosions and spills at plants. Mr. Pruitt is also behind the creation of the plan to release the US from the Paris climate change agreement.

As Mr. Pruitt is not conferring with scientists and staff members at the EPA and is instead outsourcing work and input to lawyers, lobbyist groups and Republican state attorneys general, a representative from a government watchdog group has referred to his actions as a "corporate takeover of the Agency." For his part, Mr. Pruitt argues that he is pursuing the rights of individual states and pushing back on over-reaching federal regulatory control.

Source: *New York Times*

Pharmaceuticals

Pharmaceutical companies are incorporating Artificial Intelligence (AI) to increase R&D efficiency and productivity. They are using supercomputers and machine learning systems to predict the behavior of molecules and to gauge the likeliness of whether the molecules can be incorporated into a useful drug.

Earlier this month, pharmaceutical giant GlaxoSmithKline (GSK) announced a collaboration with Exscientia, a drug design company that uses AI technologies for drug research. According to the company, Exscientia's AI systems are estimated to deliver drug candidates in a quarter of the current time and at a quarter of the current cost. Exscientia has also partnered with Sanofi, Berg, Numerate, twoXAR, Atomwise and BenevolentAI. Although the technology has yet to be proven, pharmaceutical companies are optimistic that AI systems could decrease the cost of drugs and the R&D time it takes for patients to obtain them. GSK, for example, hopes to cut the time it takes for identifying a disease intervention target and researching the molecule that fights it from an average of 5-and-a-half years to 1 year through the use of AI systems.

According to industry experts, if AI technology proves efficient in streamlining pharmaceutical research, there may be even more mergers in the pharmaceutical industry and a greater integration of AI within drug R&D.

Source: *Reuters*

EU

The 2017 report on the European Innovation Scoreboard indicates that despite uncertainties and inconsistent progress in innovation on the continent, the EU's innovation performance continued to rise in 2016. This year's report includes a new measurement framework that includes an improved timeliness of indicators, incorporating evolving policies into the innovation dimensions, a better analysis of digital and startup activities and a new category on innovation-friendly environments. The top six countries in innovation are Sweden, Denmark, Finland, the Netherlands and the UK, with this report marking the first time the UK has been an innovation leader. Compared to the EU average R&D performance in 2010, Sweden has improved 2.3%, the Netherlands has risen 10.4% and the UK has jumped 11.7%, while Denmark and Finland's performance has declined 2.8% and 5.1%, respectively. Lithuania, Malta, the Netherlands, Austria and the UK are the fastest growing countries in innovation, with their performances increasing by a minimum of 5% each.

Between 2010 and 2016, the EU average for innovation increased 11.8%. During this period, Portugal had a 50.3% increase in performance, followed by Finland with 41.0% and Poland at 38.9%. Austria has had the greatest drop in performance, decreasing 50.7% during the 10-year period.

The report indicates that international copublications and the rising number of university graduates and doctorates are among the areas that have improved the most, while investments by venture capital firms and the share of small- to medium-sized enterprises developing innovations have declined.

Firm investments, which include business R&D expenditures and non-R&D innovation expenditures, improved 13.6% from 2010, and international copublications increased 54.2%.

EU innovation performance is forecast to increase 2% by 2019.

Source: *European Commission*

India

At the end of last month, the Indian government launched a "National Biopharma Mission," the nation's first initiative to increase drug production through collaborations between industry and academia. Named Innovate in

India (i3), the initiative will be funded by an investment of $250 million as well as a loan from the World Bank of $125 million.

India's current share of the world's biopharmaceutical industry is 2.8%, and the government hopes that i3 will bump it up to 5%, or an additional $16 billion in business. Although India is active in generic drugs and low-cost pharmaceutical products, due to a lack of cohesion between centers of excellence, traditionally lesser concentration on translational research and inconsistent federal funding, India is about a decade behind in drug production compared to competing countries such as China and Korea.

The initiative will accelerate the domestic biopharmaceutical industry through the commercialization of research products, supporting clinical validation, establishing strong networks between industry and academic research institutes, and creating a startup-friendly ecosystem. i3 will be implemented by the Biotechnology Industry Research Assistance Council.

Source: *Government of India, Ministry of Science & Technology*

Life Science Consumables

General Life Science Consumables

In June, **SYGNIS** announced that Co-CEO Dr. Heikki Lanckriet will become sole CEO and will retain the role of CSO. Former Co-CEO Pilar de la Huerta will be nominated to join the Supervisory Board but has resigned from the management board.

Streck announced several new distribution agreements: **VIAGENE** for Slovak and the Czech Republic; **Genomax Technologies** for Singaapore and Malaysia; **Golden Bat (Far East)** for the Philippines; **Biozatix** for Indonesia; **Ngaio Diagnostics** for New Zealand; **Nordic BioSite** for Sweden, Finland, Denmark and Norway, and **Danyel Biotech** for Israel.

Consumables for Gene-based Analysis

Company Announcements

In May, **ATUM** announced a patent licensed agreement giving **Thermo Fisher Scientific** access to its novel gene design platform. Gene Designer 2.0 software for gene design provides a graphic representation of a gene sequence.

In May, **Canon Biomedical** named **Cedarlane** as a Canadian distributor of its Novallele genotyping products.

In June, **Transgenomic** shareholders approved its merger with **Precipio Diagnostics** (see ***IBO*** 10/15/16). The stock will be relisted on the **NASDAQ** under the new symbol PRPO.

In June, synthetic DNA provider **Twist Bioscience** announced an additional $27 million in venture financing, completing a $60 million financing round. To date, the company has raised $191 million.

Twist Bioscience partnered in June with **Synbio Technologies** to provide customers with long-length genes up to 70 kb. Twist will manufacture synthetic DNA up to 3.2 kb for Synbio, which will then create genes up to 70 kb.

In July, **Twist Bioscience** partnered with service firm **Quintara Biosciences** to launch the qBlock Gene Fragments and qGene DNA cloning services. The services will be available for 9¢ per bp for any gene fragment between 300 and 1800 bp.

In June, the **Australian Patent Office** awarded **MilliporeSigma** its first CRISPR patent. The patent rights related to the use of CRISPR in a genomic integration method for eukaryotic cells. The company has also filed for the patent in other countries.

Canopy Biosciences announced in June a distribution agreement for Japan with **Cosmo Bio** for its TUNR Flexible Gene Editing technology.

Product Introductions

In June, **Empirical Bioscience** introduced the PFU-50 ultra-high-fidelity polymerase for PCR. It delivers a fidelity that is 50 times greater than Taq polymerases, according to the company.

Integrated DNA Technologies released in June the rhAmp SNP Genotyping System for fast, cost effective, accurate and confident SNP calls. Assays are shipping in less than seven business days. The single tube assay is easily automated.

In June, **Bio-Rad Laboratories** released ddPCR Genome Edit Detection Assays for characterizing edits generated by CRISPR-Cas9 or other genome editing tools. Assays are available through the company's Digital Assay Site.

Thermo Fisher Scientific launched in July the Sterilin universal RNase-, DNase- and human DNA–free containres for molecular biology, genomics and forensic research. They can accommodate a working sample volume of up to 25 mL.

Orders/Sales of Note

In June, **Twist Bioscience** announced an agreement to provide 10,000 genes to the **BioBricks Foundation** (BBF) base on an online forum of suggestions. The genes will be made freely available by the BBF via an Open Material Transfer Agreement.

Consumables for Cell-based Analysis

Company Announcements

Horizon Discovery's 2016 revenues grew 19.4% to £24.1 million ($32.5 million) (see ***IBO*** *6/15/17*). Operating loss increased from £10.3 million ($13.9 million) to £12.4 million ($16.8 million). EBITDA declined from £4.6 million ($6.2 million) to £3.8 million ($5.1 million). Gross margins increased from 49% to 54%. Product sales (cell lines, in vivo models, bioproduction cell lines, reference standards) rose 44.6% to £11.3 million ($15.3 million). Product highlights included the introduction of seven optigenetics models and new capabilities for the gene editing of stem cells. Services revenue (cell and in vivo custom model generation, assay services, high-throughput genetic screening, high-throughput molecular screening) increased 4.9% to £12.7 million ($17.2 millions). Website traffic was up over 40%. Sales to the America, EMEA and Asia Pacific rose 0.3%, 60.4% and 59.7% to make up 62%, 30% and 9% of revenues, respectively. Revenue is expected to reach £30–£35 million ($41–$47 million) this year.

Horizon Discovery announced in June it is working with three clients using its gene and cell therapy platform for contract service and therapeutic applications. The work is expected to result in $2 million in revenues. The company is also exploring developing a universal cell therapy platform.

LAMPIRE Biological Laboratories, a provider of blood products cell culture bags, and antibody development and manufacturing, announced in May the acquisition of **H. B. Custom Media**, a supplier of custom tissue culture media, reagents, supplements and animal embryo culture media. All H. R. products will be rebranded with the LAMPIRE name.

In June, **ProBioGen** signed a license and cooperation agreement to integrate its Human Artificial Lymph Node Module into **TissUse**'s Multi-Organ-Chip technology.

Irvine Scientific announced in June the addition of a 40,000 ft^2 (3,716 m^2) R&D center to its facility in Irvine,

California.

In June, **MilliporeSigma** expanded its distribution alliance with **Public Health England** to include the **European Bank for iPSCs**, an IPS cell bank of more than three thousand human iPSC cell lines. The agreement includes all geographies except Japan.

Product Introductions

Cayman Chemical and **BMG LABTECH** announced in May the Mito Stress Test (Atmospheric Control Unit Format), an assay kit to measure mitochondrial function under a dynamic range of oxygen concentrations. It measures oxygen consumption range and extracellular acidification simultaneously.

Molecular Devices released in May the SpectraMax DuoLuc Reporter Assay Kit for sensitive quantitation of both firefly and Renilla luciferases in mammalian cells.

In May, **Irvine Scientific** released the PRIME-XV Hematopoietic Cell Basal Medium, a serum-free, xeno-basal medium that specifically supports robust expansion of hematopoietic progenitors while maintaining their multipotency.

Provia Laboratories introduced in May a comprehensive library of stem cell material for researchers for mesenchymal stem cell research.

In June, **Miltenyi Biotec** launched the "MACSPlex Exosome Kit, human," enabling the qualitative and semi-quantitative analysis of 37 exosome surface markers in a single experiment using flow cytometry.

Sales/Orders of Note

In June, **Horizon Discovery** announced that **Abcam** extended its license and supply agreement through 2018. Horizon provides exclusive access to its human diploid and haploid cell line models for functional validation of Abcam antibodies.

Consumables for Protein-based Analysis

Product Introductions

In May, **CDI Laboratories** announced that over one thousand new recombinant proteins will be added to its HuProt human proteome microarray.

Genovis launched in May three unique enzymes for O-glycan analysis: OpeRATOR, OglyZOR and SialEXO.

In June, **Aalto Bio Reagents** released native and recombinant West Nile virus proteins for diagnostic test developers, vaccine developers and researchers.

In June, **GenScript** launched its MonoRab custom rabbit–monoclonal antibody service.

Sales/Orders of Note

In June, **Bio*Auxilium* Research** announced the development of its 100th custom TR-FRET immunoassay kit. TR-FRET does not require plate coating, washing or separation steps.

GC & GC/MS

Company Announcements

In May, **Phenomenex** opened a new 15,000 ft^2 (1,394 m^2) GC manufacturing and development facility for its Zebron brand near Sacramento, California. The new location supports twice the product capacity.

2D GC x GC technology company **SepSolve Analytical** announced in June that it is expanding its business from methods advice and the sale of the INSIGHT flow modulator (see below) to an expanded range of tailored product packages. It is also now an OEM reseller of **CTC Analytics**, **EST Analytical**, **GC Sciences**, **Markes** and **UVU Analytics** products. Both SepSolve and Markes are owned by **Schauenburg International**.

In June, development capital company **Jolt Capital** and investment group **Abrosia** acquired **Diagnostic Medical Systems**' 43% equity stake in **Alpha MOS** and 98% voting rights for €6.5 million ($7.3 million). Alpha MOS remains a publicly listed company on the **Euronext Paris** stock exchange.

Product Introductions

In May, **Phenomenex** launched three Zebron GC columns specially designed for the analysis of fatty acid methyl esters in food. The Zebron ZB-FAME is shorter than traditional solutions, providing faster analysis times and selectively targets a 37-compund mixture. The Zebron ZB-88 is for the separation of cis/trans isomers. The Zebron ZB-23 is a cost effective solution to existing 23-phase columns for separation of cis/trans isomers.

FLIR launched in June the handheld FLIR Griffin G510 GC/MS system for first responders. It features an integrated heated sample probe and split/split-less injector. It will be available for order in the second half of the year.

In June, **SepSolve Analytical** released the INSIGHT flow modulator for routine comprehensive 2D GC x GC. It eliminates the use of liquid nitrogen, reducing the cost of 2D GC x GC. Precise control of gas flows fill and flush a sample loop to fractionate the first column effluent and deliver it to the second column.

908 Devices launched in June the cost effective, transportable G908 3-in-1 Cannabis Analyzer for cannabis production and testing. The system enables testing of total potency, terpenes and residual solvents using only one instrument. It performs residual solvents analysis five times faster than legacy lab instruments, according to the company.

Resktek released in June the Raptor HILIC-Si column, which retains polar compounds without ion pairing reagents.

SRI Instruments introduced in June the portable Model 310-MM GC, priced at $9,995, and Model 420 GC, priced at $4,995, for lab-quality cannabis analysis.

In July, **ALPHA MOS** launched the new GC-based Heracles Neo electronic nose, featuring easier data processing and an increased dynamic range.

Laboratory Products

Lab Automation

Company Announcements

In May, **HighRes Biosolutions** announced that Lou Guarracina has stepped down as CEO but will remain on the Board. New CEO Peter Harris, a Board member, most recently served as vice president and managing director of

Axel Johnson, HighRes' majority owner

BioTek Instruments announced in May the completion of a $4.5 million 22,000 ft^2 (2,044 m^2) facility expansion and renovation, increasing manufacturing area by 33%. A new training facility was also completed.

For the epMotion 5070, 5073 and 5075 automated liquid handling systems, **Eppendorf** released in May the TS 10 single-channel and TM 10-8 eight-channel dispensing tools, available with epT.I.P.S. Motion in seven variations. Also new is a 10 mL reservoir consumable.

Lab Equipment

Company Announcements

MilliporeSigma announced in June that it won a false advertising lawsuit against Belgium distributor **Analis** concerning advertising. The advertising stated that **RephiLe Biosciences'** lab water products were equivalent to MilliporeSigma's.

Porvair reported that revenue for **Seal Analytical**, which makes discrete automated wet chemistry analyzers, for the half fiscal year ending May 31 grew 16%. The business also opened a new US manufacturing facility.

In July, dissolution testing maker **ERWEKA** announced the retirement of Werner G. Müller as CEO. His wife replaces him.

Product Introductions

In May, **Porvair Sciences** launched the new Glass Vial Deep-well plate, designed to ensure that no extractables and leachates are present in the sample. The 96 mL x 1 mL glass vials are held firmly in each well of a 2 mL 96 deep-well plate.

In May, **Eppendorf** launched the Innova S44i biological shaker, featuring a new drive. It can be integrated with VisioNize software.

Eppendorf introduced in May the new CryoCube F740 freezer series for ultra-low-temperature sample storage. It features a capacity of 740 L/576x boxes, improved energy efficiency and noise reduction. It can be monitored with VisioNize software.

In May, **Shimadzu** added new high-sensitivity, semi-micro analytical balances to its AP-W series: the AP135W, AP125WD and AP225WD. They feature a minimum reading of 0.01 mg and a buffer-solution preparation function. Measurements are completed in approximately two seconds.

Panasonic Healthcare North America introduced in June the TwinGuard -86°C upright freezers, available in two sizes, for storage of biological samples. They feature next generation dual cooling systems and greater capacity. They are covered by a five-year warranty.

In June, **SUEZ Water UK** released the Select edi compact 60 benchtop laboratory water purification system, combining double-pass reverse osmosis and electro-deionization technologies. This eliminates the need for conditional cartridges and carbon dioxide pretreatment filters.

In June, **OHAUS** unveiled a new laboratory equipment portfolio for the life sciences. The products include a range of shakers, vortex mixers, dry block heaters, hotplate stirrers, clamps and lab supports.

In June, **Biotage** released its second generation Turbo Vap evaporation systems, consisting of the TurboVap LV, II and EH models. New features include enhanced visibility. The company also released a series of Multi-Racks offering greater flexibility for a variety of tube and vial sizes.

Electrochemistry

Product Introductions

In June, **LG Sonic** launched a nitrate sensor integrated with its water quality sensor package delivered with the MPC-Buoy for monitoring algal blooms.

Metrohm introduced in July a new version of the 916 Ti-Touch Titrator for potentiometric titration. New features include the ability to connect a second titration stand, do pH-STAT titration and 24-sample automation.

In July, **Metrohm** released the 946 Portable VA Analyzer, a compact, portable heavy metal analyzer for trace-level quantification in surface waters. It features the scTRACE Gold disposable sensor.

Reported Financial Results

$US	Period	Ended	Sales	Chg.	Op. Prof.	Chg.	Net Prof.	Chg.
Organovo	FYE	31-Mar	$4.2	180.0%	($38.6)	0.0%	($38.4)	0.5%
Protea Biosciences	FYE	31-Dec	$2.4	26.3%	($5.5)	22.5%	($15.6)	-62.5%
Other Currencies								
Environnement SA	FYE	31-Dec	€ 76.6	8.5%	€ 8.4	27.3%	€ 7.7	35.1%
Syft Technologies	FYE	31-Mar	NZD 8,260	36.3%	NZD 746	-45.2%	NA	NA

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