Illumina and LifeTech offer thousand-dollar genomes

Curious Coincidence

Here they are, the wonder machines that decode billions of bases overnight for a knockdown price.

On 10th January this year, two competing sequencing machine producers presented the long-awaited ‘thousand dollar genome’. Illumina (San Diego, USA) announced their brand new HiSeq 2500 instrument, allegedly able to sequence an entire genome in 24 hours. At the same time, US competitor Life Technologies (Carlsbad) introduced their benchtop Ion Proton sequencer, build by Ion Torrent, that is also able to decode a human genome in one day for $1,000 (€790).

The new geneticists’ toys further increase the speed of DNA sequencing and will have an impact on both basic research as well as on applied sciences (primarily on medical diagnostics). Despite making enormous strides in recent years, modern high throughput DNA sequencing still takes a few weeks and costs between €4,000 and €8,000 per (human) genome. The new devices, however, enhance sequencing speed by another ‘factor 10’ step while reducing the price tenfold.

And the price is...

Ah yes. The price. The new Illumina gadget will cost €570,000 and be available as an upgrade version to the company’s current top-level sequencer, while LifeTech’s new machine can be purchased for an unbelievable €115,000. To rescue Illumina’s reputation, their HiSeq systems are known to provide far more accurate results than Ion Torrent’s semiconductor devices (see comment on page 50). LifeTech confirmed this (at least unintentionally) by emphasizing that their Ion Proton sequencer is not for diagnostic or therapeutic use.

Both manufacturers are very young businesses. Illumina was founded in April 1998 by three young postdocs from Tufts University, near Boston, encouraged by two venture capital experts. Within 13 years, the former start-up had swelled to over 2,100 employees, yielding a turnover of around €840 million in 2011.

Life Technologies may seem far bigger and more established, but their sequencing technology is entirely developed by the Ion Torrent specialists who were adopted after their mother company’s acquisition in August 2010. Originally, LifeTech’s sequencing technology was the brainchild of Ion Torrent’s founder, Jonathan Rothberg. Rothberg, aged 48, can be seen as the inventor of massively parallel DNA sequencing. He once also founded 454 Life Sciences, the company that developed the first high throughput sequencing machine.

Winfried Koeppelle

Antisense? Still Alive!

California-based company Isis Pharmaceuticals is to earn up to €235 million from a single antisense therapy. Their new collaborator, Biogen Idec, will disburse an upfront payment of €22 million to participate in the development and marketing of Isis’ experimental antisense medicine that targets spinal muscular atrophy (SMA).

SMA is an incurable neuromuscular disorder that is the most common genetic cause of infant mortality: A mutated SMN1 gene on chromosome 5 results in altered motor neuron proteins (SMN), then in the death of neuronal cells and, consequently, in system-wide muscle wasting. Those affected by less severe forms of the disease can have a normal life expectancy but suffer from muscular atrophy, due to the lack of SMN, and have to live a wheelchair-bound life. About 30,000 patients in Western industrialised countries suffer from SMA.

Isis’ antisense remedy doesn’t influence the defective SMA1 gene, rather the functional efficient SMN2 gene (all patients have at least one, often several, copies of the SMN2 gene). The drug modulates the splicing of the efficient gene in order to increase production of functional SMN proteins, thus allowing neurons to survive. Focused on antisense technology, Isis Pharmaceuticals has 28 additional experimental drugs in its pipeline to treat several other diseases. Currently, the company’s scientists are conducting preclinical studies on their SMA drug. Clinical testing is to start soon.

Interestingly, Swiss drug maker Roche has also recently invested in a genetic drug project for SMA. Roche’s partner, the American PTC Therapeutics, will receive as much as €386 million for the development of their three preclinical SMA drugs. The PTC scientists also target post-transcriptional control processes in human cells and favour alternative splicing as a therapy option.

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Funding for nutrition and obesity

French Cuisine and Scottish Remedy

Who cares about AIDS, tuberculosis and cancer? Malnutrition is the most alarming health risk and, according to the WHO, “the greatest single threat to the world’s public health”. We learn from statistics that 58% of total mortality is due to malnutrition. Thus, there’s urgent demand for companies like Biophytis, located in the Parisian technology park Biocitech, that aims to improve the nutrition of the elderly and to prevent and treat sarcopenic obesity. Biophytis claims to do this exclusively, “with natural substances”, which raises the possibly impertinent question, “which substance on this earth is NOT natural?”

Besides such hair-splitting, it will be interesting to see if Biophytis’ research and development results will be able to reduce the prevalence of obesity among the over-50s in Europe (in 2008, it was around 16 per cent for men and 18 per cent for women, according to the latest study). To succeed, Biophytis recently obtained a subsidy of €1.5m from the French Interministerial Fund. Another participating start-up is Metabrain Research, which provides preclinical research services, as well as interdisciplinary university research teams (all from Paris).

Maybe the French consortium will receive unforeseen support from Scotland. The UK’s Technology Strategy Board recently announced that it will invest nearly €19 million in a number of new research and development projects that will help to secure the sustainable supply of protein such as meat, fish and animal feed. Possibly they will also get “more natural food” as byproducts, who knows?

Renova’s rabbit deal with Pharming

Milked Bunnies

Biotech company Pharming (Leiden, The Netherlands) is once again set to produce unusual dairy products. Together with their American partner, Renova Life, they are seeking to develop a set of therapeutic proteins to treat human diseases. The first protein to be expressed in, well, rabbits, is to be recombinant human Factor VIII (rhFVIII), a remedy to treat haemophilia A, the most common form of the hereditary blood disease. Renova Life will supply a founding stock of transgenic rabbits that will enable Pharming to proceed with their commercial production breeding process in industrial quantities. According to Pharming’s marketing statements, recombinant human proteins can be produced at significantly lower cost than current cell based methods.

An overblown deal concerning a few transgenic bunnies? Hardly, given a present rhFVIII market of more than €3 billion that covers just half of the global demands. There’s a lot of milk, er, money in those rabbits!

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Eppendorf acquires Dasgip

Change of Ownership

In January, the German lab supplier Eppendorf snapped up the Dasgip Group, a German-American developer and manufacturer of parallel bioreactor systems for cell culture and of the software to operate them. With this acquisition, Eppendorf, well-known for their eponymous reaction cups (‘eppi’ tubes), has again increased its range of devices and systems for use in life science research labs.

In 2007, Eppendorf acquired the US-based fermentor and freezer manufacturer, New Brunswick Scientific (NBS) of New Jersey, for about €80 million. This time, the purchase price is being kept secret; but it should be significantly lower than for NBS, given the smaller size of Dasgip. One thing, however, is certain: With this new acquisition, around 50 new employees will move to Eppendorf, which already has a staff of 2,500.

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