

biotech focus

Biotechnology in Ireland: hard work, money and the brain gain

Michael F O'Neill, mfon@eolasbio.co.uk

Over the past decade, Ireland has been one of the great economic success stories of the European Union (EU). Annual growth rates in Gross Domestic Product (GDP) reached double figures (1997–2000), earning Ireland the tag of the 'Celtic Tiger' as its economic performance more closely resembled the booming economies of Southeast Asia than any of its fellow EU partners. Even as these unsustainably high figures level out, figures from the Organization for Economic Cooperation and Development (OECD; <http://www.oecd.org>) show that Ireland has maintained an average growth rate of >6% over the past four years versus the OECD average of 2.5%. Long a host to manufacturing industries, Ireland is now keen to build higher value research and development sectors in its economy. Micheál Martin, the Government Minister for Trade and Commerce, said at BIO2005 in Pennsylvania that 'The Irish Government is committed to a pro-business, pro-science environment to transform Irish industry.' Here, I show how this ambition is being put into practice in the biopharmaceutical sector in Ireland.

Educational and scientific infrastructure

Economic reforms based on reduced taxation from the late 1980s to the mid 1990s gave Ireland a stable basis for economic growth and gave the Government ever-increasing tax revenues which enabled investment in long-neglected university infrastructure. Investment in R&D as a proportion of GDP has traditionally been low but recent initiatives have begun to

address this issue. The Science Foundation of Ireland (SFI; <http://www.sfi.ie/>) was founded in 1998, with the aim to nurture the longer term evolution of science in Ireland. It now has the SFI Grant Scheme with €600million (US\$765million) to invest in basic research at the university level, of which €190million (US\$242million) was dedicated to biosciences. The National Development Plan for 2000–2006 earmarked €698 million (US\$890million) to expand R&D infrastructure in third-level institutions, mainly universities and institutes of technology, a further €484 million (US\$616 million) was dedicated to support industrial R&D whereas €711million (US\$905million) was made available to the Technology Foresight Fund to help develop key strategic areas, most notably biotechnology. A tangible realization of this increased investment was the new €22 million (US\$28 million) pharmacy school opened as part of University College Cork (<http://www.ucc.ie>) in March of 2006. Its expressed aim is to build academic–industry partnerships to help foster collaborations in the pharmaceutical sector. Permission to build a bioprocessor campus has also been received by the Industrial Development Agency (<http://www.idaireland.com/>) in Oranmore, Galway.

The pharmaceutical industry in Ireland

Ireland has always hosted a significant pharmaceutical sector, with 13 of the top 15 major pharmaceutical companies having manufacturing facilities dotted throughout the country (Figure 1). These companies benefit from the

generous corporation tax rate of 12.5%, which is one of the lowest rates in the EU. Pharmaceuticalss continue to make a considerable contribution to the balance of payments in Ireland, accounting for €35billion (US\$45 billion) in exports in 2004 alone or 36% of the total exports of the country. Recently, however, the potential of its location (as an english-speaking country in the EU), highly educated workforce, a low population density and favourable tax environment has resulted in research facilities also locating in Ireland. As one of the first companies to invest in Ireland during the 1960s, Wyeth (<http://www.wyeth.com>) has also headed this trend, opening a new research facility in Grange Castle in 2005, outside Dublin to add to their successful manufacturing plants in Askeaton, Co. Limerick and in Sligo. Amgen (<http://www.amgen.com>) have also recently announced their plan to invest €800million (US\$1000million) in a new plant in Carrigtwohill, Co. Cork. The plant will eventually employ 1,100 people.

Government support for biotechnology companies

Ireland has been successful in cultivating a growing indigenous biotechnology sector stemming from universities while simultaneously encouraging foreign-owned firms to locate a significant portion of their research in the country (Table 1). Enterprise Ireland (EI; <http://www.enterprise-ireland.com/>) is the Government agency catering to both sides of this push–pull policy of pushing local development and pulling in inward investment. Paul Roben, EI's Director of Biotechnology Commercialisation, explained the different levels of assistance they provide: from assistance in starting up a venture, finding the right management team and investment partners to a generous grant scheme and continued support

**FIGURE 1**

Some key sites for biotechnology and pharmaceutical activity in Ireland. Startup and spin out companies are concentrating around Dublin, pharmaceutical manufacturing and services predominate around Cork, while Galway in the west is the centre for medical devices and planned bioprocessing facilities.

throughout the lifespan of a company. This range of corporate mentoring measures includes sourcing non-executive directors or mentors to provide vital external experience and contacts as the companies grow.

Instead of straight grants, the agency now often takes a small stake in the companies with some preferential share options. As Stephen Hughes of EI explained to me 'We do not really seek to make money from this scheme, it is simply a means for us to recycle funds from

some of our successful ventures back into new companies'.

Start up biopharmaceutical companies

All of the major universities now have incubators that host successful start-up companies in the Republic and in Northern Ireland (Table 2). The usual mix of diagnostics, service and product companies are found in these incubators, with reprofiling or repurposing companies also making a significant contribution.

A quick look at a few of the more recent success stories shows what a varied landscape exists in Irish biotech (Table 3). Eirx (<http://www.eirx.com>) was founded in Cork University in 1999 by Peter Daly and Tom Cotter with a group of colleagues from the Department of Biochemistry. Building on their expertise in gene expression analysis, they set out to explore the therapeutic potential of targeting apoptotic mechanisms in cells for the treatment of cancer and other diseases where apoptosis might have a role in pathology. The company was launched on the Alternative Investment Market in London in 2001 and has since acquired Auvation (<http://www.auvation.com>) in Scotland.

Agi Therapeutics (<http://www.agitherapeutics.com>) in Dublin was founded in 2003 by executives from Elan (<http://www.elan.com>) to explore novel uses for known molecules for the treatment of gastrointestinal disorders. The company has built up an impressive collection of half a dozen compounds in Phase I and Phase II trials. The company also launched on London's AIM and the Dublin IEX, raising €42.5million (US\$58 million).

Opsona (<http://www.opsona.com>) was founded at the instigation of Mark Heffernan, an entrepreneur with previous experience in starting up biotechnology companies in Australia. He drew together a team of international-class researchers in immunology from Trinity College Dublin. The immediate focus of the company, to find treatments for autoimmune conditions, has attracted considerable interest and they have already signed a major funding deal with Genentech (<http://www.gene.com>).

Investment environment for Irish biotechnology

Ireland's flourishing economy also supports a lively venture capital sector. Sixteen venture funds invested more than €25million (US\$32million) in 57 life sciences projects during 2004, which was regarded in the sector as a quiet year compared to the boom of 2000–2001. Tony

TABLE 1**Breakdown of Irish biotechnology industry by sector and ownership**

Sector	Irish		Multi-national		Total	
	No. of companies	No. of employees	No. of companies	No. of employees	No. of companies	No. of employees
Diagnostics	16	927	5	730	21	1657
Biopharm	8	60	8	1973	16	2033
Bio-environmental	4	49	0	0	4	49
Agri-food	6	61	5	216	11	277
Biotech platforms services	7	74	0	0	7	74
Total	41	1171	18	2919	59	4090

TABLE 2

Breakdown of Irish biopharm start-up companies by region^a

Region	No. of companies	No of indigenous companies (ICs)	Average age of ICs
Dublin	16	12	4.8
Belfast	14	14	5.2
Cork	8	4	4.8
Galway	5	3	2.7
Coleraine	3	3	5.3

^aData also show relative contribution of Irish companies to overall total and the average age of the indigenous ICs.

TABLE 3

Examples of Irish biotech companies

Irish start-ups and biotechs	Founded	Location	Speciality	Investment	Products and/or services	Pipeline compounds
AGI Therapeutics (http://www.agitherapeutics.com)	2003	Athlone	Repurposing for GI Indications	ACT Venture Capital Seroba BioVentures Delta Partners Merlin Biomed Group	KME (known molecular entities)	AGI-001 in PII AGI-003 AGI-004 AGI-006 AGI-010
EiRx (http://www.eirx.com)	1999	Cork	Drug discovery oncology Anti-apoptosis	3i Billam PLC Floated LSE:AIM 2004 Acquired Auvation (Scotland) 2005	ALIBI target identification system; siRNA delivery system	
Genable (http://www.genable.ie/)	2004	Dublin	RNAi retinitis pigmentosa	Delta Partners	n/a	GT015 GT025
Luxcel (http://www.luxcel.com/)	2003	Cork	Research services Screening technology	Enterprise Ireland	RST services microplates; oxygen sensors; phosphorescent labels and bioconjugates	n/a
Opsona (http://www.opsona.com)	2004	Dublin	Immune modulators Inflammation	Delta Partners Enterprise Ireland Genentech Inventages Venture Capital Seroba Bioventures	n/a	OPN-101 OPN-201

Shiels, Chief Executive of Enterprise Assist (<http://www.enterpriseassist.co.uk>), and manager of one of the more successful venture funds, The Millennium Entrepreneur Fund, told me that the successes of previous ventures was encouraging more people to invest in biotechnology and that there were several funds still looking for opportunities for investment. This message was reinforced by Seamus O'Hara of Seroba Ventures, Ireland's only fund dedicated exclusively to investing in biotechnology, who told me that they too were looking for further opportunities to invest. The proximity to London (1-h flight from Cork or Dublin) with its vast resources and markets has always meant that London's financial markets are a more probable target for Irish biotech companies seeking funds than local financial markets.

Industry sales are also a probable exit strategy option for companies as they develop and grow. As this can result in the closure of the local site of the company and the relocation of core tech-

nology and even staff to the parent company, often in another county, EI has grant schemes that encourage purchasing companies to maintain a headquarters and a significant proportion of the research of the company in Ireland, following an international acquisition.

The brain gain

Ireland experienced mass emigration up until the 1990s, when its dramatic economic transformation began to offer more opportunities to its young people. One consequence of the 'diaspora' is a network of highly trained and experienced Irish people in most sectors of every economic centre in the world. These people are keen to help to promote Ireland and its interests worldwide Techlink Ireland-UK (<http://www.techlinkuk-ireland.com/>) and its sister organization Biolink Ireland-USA (<http://www.biolinkusaireland.org/>) are networks of Irish people working in technology sectors in the UK and USA. These were set up with the aim of identifying top Irish talent willing

to relocate back to Ireland They have discovered what the rest of the world calls 'networking', combining business with conviviality, which in Ireland is called 'craic'. Both organizations use this national pastime to good effect in the UK and USA showcasing Irish biotechnology and fostering links with companies and individuals in the host countries. The Irish Government is also keen to draw on this wealth of experience, and actively encourages people to repatriate to both the Republic of, and Northern, Ireland.

The attractiveness of living in Ireland, such as the scenery and low population density, can be mitigated by the poor transport infrastructure and high housing costs. The Government has promised investment in transport to relieve the chronic congestion problems of Dublin and the poor quality of the road network outside the capital. That said, Ireland is now experiencing a net immigration of nearly 100,000 people a year, divided almost equally between returning expatriates and new immigrants, primarily from

the new EU accession countries in Eastern Europe.

The future of Irish biotechnology

It is hard not to be impressed with the enthusiasm of people in Ireland for biotechnology and the optimistic outlook that they hold for its

future. It is an optimism tempered by realism. As everywhere, government can only do so much in supporting and encouraging companies, but the real value of a biotechnology sector comes from the science, the scientists and their projects. In this regard, one can see that Ireland has so far made a promising start. In this business, success

breeds success and this bodes well for the Irish biotechnology sector.

Michael F. O'Neill

*Eolas Biosciences Ltd,
Windmill Road, London,
W5 4DH, UK*

Have you contributed to an Elsevier publication? Did you know that you are entitled to a 30% discount on books?

A 30% discount is available to all Elsevier book and journal contributors when ordering books or stand-alone CD-ROMs directly from us.

To take advantage of your discount:

1. Choose your book(s) from www.elsevier.com or www.books.elsevier.com

2. Place your order

Americas:

Phone: +1 800 782 4927 for US customers

Phone: +1 800 460 3110 for Canada, South and Central America customers

Fax: +1 314 453 4898

author.contributor@elsevier.com

All other countries:

Phone: +44 (0)1865 474 010

Fax: +44 (0)1865 474 011

directorders@elsevier.com

You'll need to provide the name of the Elsevier book or journal to which you have contributed. Shipping is free on prepaid orders within the US.

If you are faxing your order, please enclose a copy of this page.

3. Make your payment

This discount is only available on prepaid orders. Please note that this offer does not apply to multi-volume reference works or Elsevier Health Sciences products.

For more information, visit www.books.elsevier.com