BIOCHEMICAL SOCIETY

BIOCHEMISTS IN INDUSTRY

Contents

Updated September 2017

INTRODUCTION

Deciding which career path to follow can seem overwhelming with the wealth of opportunities available. Some people may decide to pursue undergraduate and postgraduate degrees whilst others may move into apprenticeships or employment. There are many science-based careers where you can use your specialist skills and knowledge; some of these careers can be found in industry.

What is industry?

INDUSTRY is a broad term that refers to various companies and organizations which provide services or goods for a profit. For a biochemist, there are a wide range of different roles available in various industries, ranging from research and development to sales, marketing and management.

Biochemists can be found working in numerous areas of industry. Among the areas which offer opportunities for biochemists are:

- Drug Discovery
- Consumer Goods
- Diagnostics
- Clinical Biochemistry
- Service Providers
- Biomaterials and Biotechnology
- Agrochemicals
- Food Formulation

Within these sectors, there are many opportunities for biochemists to be part of cutting edge research and develop the next lifesaving medicine or superfood. Research and development in industry differs from that done in academic research institutions because traditionally in academia the pursuit of knowledge drives the project rather than the desire to create a product. However, this distinction is becoming blurred as collaboration is more common.

The face of industry consists of more than just large scale companies, such as the drug company giants or well-known food brands. More and more small and medium-sized enterprises (SMEs) are emerging in every sector and changing industry across the UK and the world. SMEs will, by definition, be smaller than the large companies, employ fewer people and have a lower turnover. However, they often fill a niche gap and provide expertise in producing certain products or mastering particular techniques and technologies, meaning they frequently work with larger companies. If you chose to pursue a science-based career in industry, there are many options available to you.

Drug discovery

The role of the pharmaceutical industry is to design and create new medicines to treat a range of health conditions. The pharmaceutical industry employs around 73,000 people in the UK, with 23,000 working in research and development (R&D)*.

SMALL-MOLECULE DRUGS:
Chemicals with a medicinal effect.

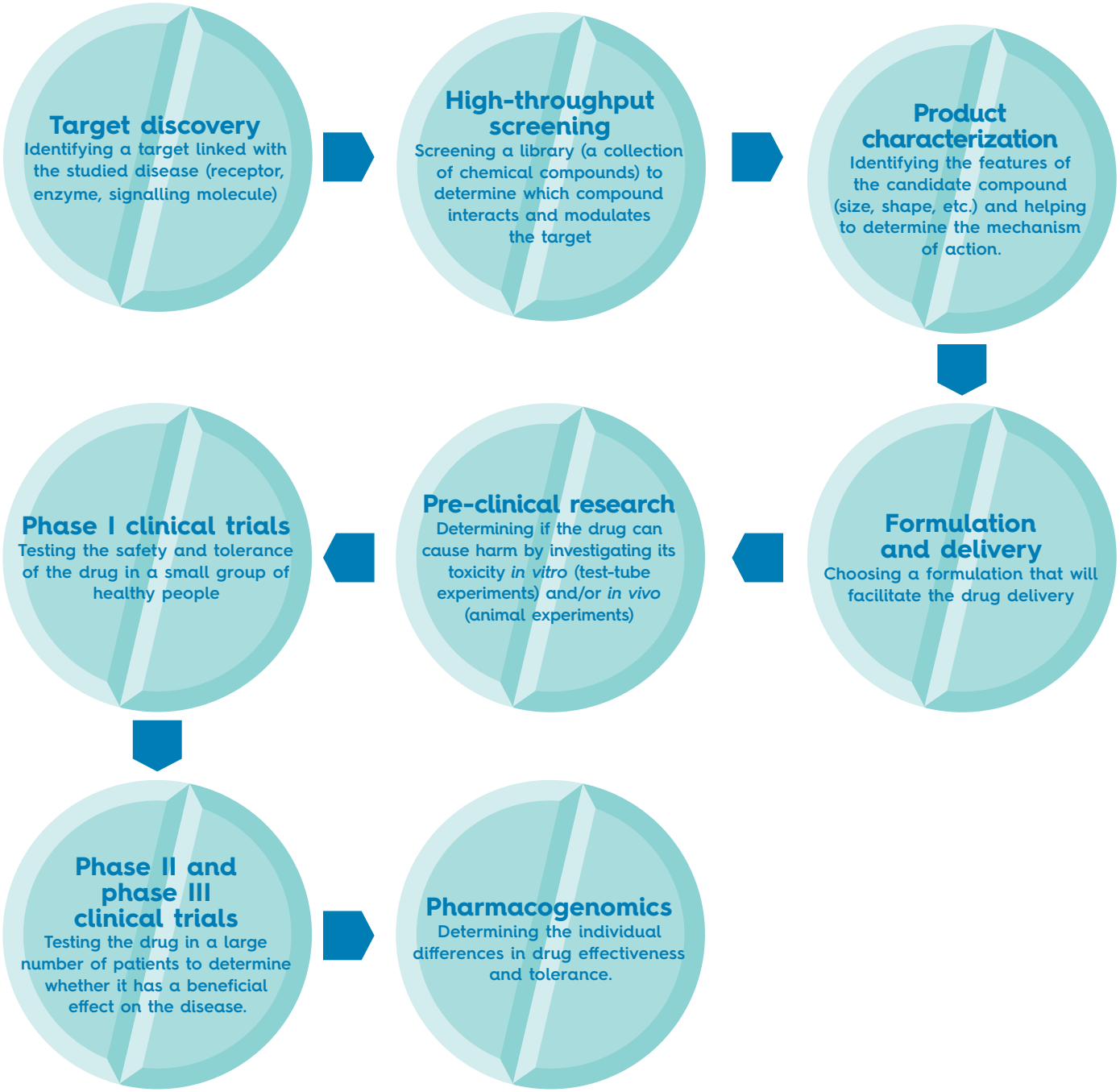
BIOPHARMACEUTICAL PRODUCTS:
Large-protein molecules such as antibodies and hormones with medicinal effects.

Drug discovery is a vital part of the pharmaceutical industry. The medicines developed during drug discovery and development can be separated into small molecules and biopharmaceutical products.

Pharmaceutical research and development is composed of many disciplines, ranging from identifying possible drug targets in a disease to pharmaceutical formulation and researching the field of personalized medicine. With changes to drug discovery in recent years, more companies now outsource certain parts of the process. Contract manufacturing organizations (CMOs) can assist with optimizing the formulation of a drug and scale up the production for general sale. Another option is to use contract research organizations (CROs) which sometimes conduct the necessary trials to get a drug approved.

* ONS Annual Business survey 2013 (revised results), section C, Manufacturing, release date 11 June 2015. From ABPI website

Drug Development Stages



Case studies

DR AMY PROSSER

Senior Scientist at Sygnature Discovery

I have always had a passion for science which led me to study for a Human Genetics MSci undergraduate master's degree at the University of Nottingham. I particularly enjoyed being in the lab and involved in research projects, so I decided to stay at the University of Nottingham to complete my PhD. With a focus on interdisciplinary science, based between the School of Clinical Science and the School of Engineering, my PhD focused on developing novel techniques, assays and scaffolds to enhance stem cell differentiation for bone and cartilage tissue bioengineering applications. After my PhD, I knew I wanted to stay in the lab but not in academia, and decided to pursue options in industrial research.

As I was finishing my PhD, I started working as a Scientist in the Bioscience Department at Sygnature Discovery, a drug discovery contract research organisation (CRO) based at BioCity in Nottingham. Sygnature supports a broad range of projects throughout the length of the drug discovery pipeline, from early target validation through to late stage lead optimisation and even into the clinic. Many of the projects at Sygnature are large integrated projects requiring the combined skills of chemists, bioscientists, computational chemists and drug metabolism and pharmacokinetics (DMPK) scientists working closely together to drive projects forward to a common goal.

One of the best aspects of working at Sygnature is the opportunity to be exposed to multiple therapeutic areas and work alongside colleagues who have a wide range of scientific backgrounds. I have learnt lots since starting at Sygnature, from new scientific disciplines to new pieces of laboratory equipment. Working at a CRO is dynamic and fast paced, and whilst this can be a challenge, it is exciting and has allowed me to develop new skills.

To be a successful scientist at a CRO, you need to be flexible and willing to learn new things as new projects bring new demands. Excellent scientific skills are essential for any lab based scientist, but time management and organizational skills are also crucial for success in a dynamic CRO environment where projects and priorities can quickly change. Outstanding communication skills are important to deliver complex scientific results to project teams and clients in a clear and concise manner.

Gaining lab experience is really important for students. Try to get as much experience as possible from shadowing lab staff on summer placements, as any lab experience will put you in a better position when applying for PhDs or jobs after studying. Approach companies or institutions for opportunities for lab experience as a speculative application may create an opportunity that would not ordinarily be advertised.

I have always wanted to be involved in science and in-particular pharmaceutical research. During high-school work experience I visited the AstraZeneca Operations and Manufacturing Site. This really sparked my interest in industry and I went on to study biochemistry at the University of Leeds. During my degree I completed a summer placement at AstraZeneca, within Quality Control Microbiology as a Lab Technician. This increased my understanding of the work involved in ensuring pharmaceuticals are safe for use and what it is like to work within a large pharmaceutical company. I then went on to complete a final year research project studying oncogenic fibroblast growth factor receptor mutants using NMR. After graduating I returned to Quality Control Microbiology for 9 months before accepting my current position, within the High Throughput Screening team at AstraZeneca.

High throughput screening allows a large number of novel molecules to be screened against a defined target of interest. Targets of interest are chosen as they are identified as playing a major role in a specific disease. Compounds which show the desired activity are defined as 'hits' and are studied further. Further studies include ruling out any hits which are non-specific or toxic and completing concentration response curves. Chemists analyse the remaining hits and select compounds which have the best properties and activity.

Some of the skills required for this role involve good time management, being able to work independently, as well as collaboratively in a team and a strong ambition for science.

My advice would be to get as much relevant experience as possible during and after your degree. Ranging from a laboratory project in final year, to work during summer breaks, voluntary experience where possible and other roles within the industry (e.g. I worked in quality control before acquiring a position in research) to be able to see and gain a better understanding of the industry as a whole and the skills required. Work experience is a great opportunity to begin networking too. I also believe that casual/part-time work around studies, even though it may not seem relevant is of great benefit. This helps to develop personal and communication skills and improves confidence.

BETHAN HOWELLS

Research Scientist at AstraZeneca

Consumer goods

The manufacturing industry transforms raw materials into consumer goods on a large scale.

BIOSURFACTANTS
A surfactant produced by microrganisms. A surfactant helps to bring together water-soluble and water-insoluble substances. Biosurfactants are more environmentally friendly than surfactants.

COSMETICS
Products used to enhance the appearance of the body. They may contain biosurfactants.

CLEANING SUPPLIES
Products used to remove food or other types of dirt from a surface. They may contain biosurfactants.

FUNCTIONAL FOODS
Foods providing health benefits. Functional foods include vitamins, pro-biotics and antioxidants.

Manufacturing can be divided into many subsectors, such as the car industry, production of smartphones and clothing. The main sub-sectors of consumer goods with a biological basis are:

- **Home Care, such as household cleaning products**
- **Personal Care, such as cosmetics**
- **Food and Drink, such as functional foods**

Due to the diverse range of products which fall under these sub-sectors, the nature of laboratory research carried out in the manufacturing industry varies. Examples include researching the mechanisms of ageing for anti-aging cosmetic products, assessing the quality control of a cleaning spray claiming to kill 99.9% of germs and testing the effectiveness of biosurfactants.

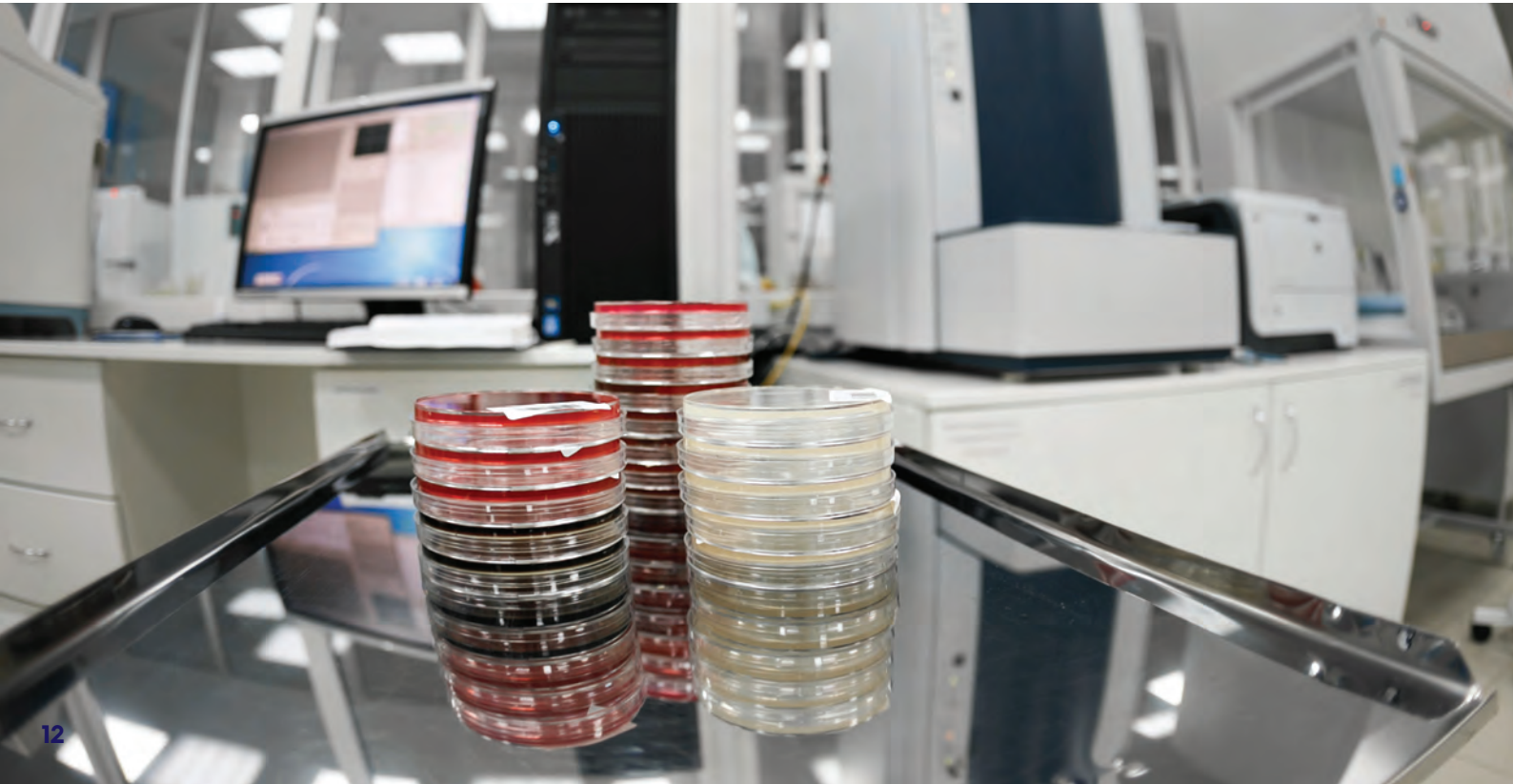
Diagnostics

The diagnostics industry produces equipment, testing kits and devices to help assess and monitor health and disease.

This sector consists of many small to medium sized enterprises (SMEs) which research, develop, test and sell kits and devices. Products range from medical equipment such as ultrasound machines to testing kits such as pregnancy tests, through to devices such as insulin pumps and pacemakers. Research varies depending on the product developed.

Researchers create a certain test by identifying biomarkers in the body and detecting their change in diseases.

BIOMARKER
A molecule used to indicate the presence or the extent of a disease state.
Examples include high blood glucose, which is a biomarker of diabetes.



Case study

DR BEN CHAFFEY

Scientific Business Development Manager, NewGene Ltd.

"I can't remember a time when I wasn't interested in science and technology, so pursuing a career in this area was an obvious choice for me.

My first degree was a BSc in Molecular Biology, which gave me a good basic level of knowledge across a broad range of life science topics, from pharmacology to photosynthesis, including immunology, which I found particularly interesting. I was therefore very pleased to be given the opportunity to investigate the activation of signalling cascades in leukocytes by immune-regulating proteins called chemokines for my final year research project, a topic which I was fortunate to continue researching as I worked towards my PhD in Applied Immunobiology.

I followed my doctorate with three years as an academic post-doc in the area of structural biochemistry, before deciding to make the move out of academia and into industry. I applied for vacancies across a wide range of industrial sectors, finally settling on a research associate position with a small *in-vitro* diagnostics (IVD) company, developing new assays for protein biomarkers. Developments in my career then gradually moved me away from the R&D bench and into management.

Currently, I am Scientific Business Development Manager for NewGene Ltd, a medical laboratory company which provides diagnostic genetic testing and contract research services to a wide range of partners including the UK NHS and blue-chip pharma. My main activities relate to development of the contract R&D services aspect of the business. This involves identifying new opportunities and developing relationships with client organizations, working with them to build an understanding of the problems they have encountered over the course of their R&D projects and the analytical requirements. I then identify the most suitable solutions negotiating contract terms before project managing the implementation of these services and ensuring the continued satisfaction of the customer.

In a Business Development position such as this, effective communication skills are vital. Tendering for research service contracts is usually a competitive process and the client must believe that you can provide the best solution for their project. For example, in scenarios such as companion diagnostic development, customers may understand their need for an IVD solution, but have no experience in diagnostics. Therefore, being able to clearly explain why the approach you recommend taking will maximise the chances of overall project success to a non-expert but extremely capable audience is crucial.

Alongside this type of project-specific content, I also create a significant amount of more general promotional literature to raise the profile of the company. I frequently represent the company at conferences and give presentations, which describe how NewGene has worked with clients to provide analytical services that are also relevant to the intended audience.

Business and commercial research and analysis also make up a substantial proportion of my work, especially when evaluating potential opportunities. Once projects are underway, good operational management skills are required to ensure work stays on schedule and milestones are reached as agreed with the client.

NewGene is a small company with a limited number of personnel and so I am able to work on many aspects of a project, for example covering tendering, contract negotiation, assay design and project management, rather than being tightly focused on a single element. This can be very rewarding and certainly gives me a feeling of ownership over projects, but an unavoidable downside of working for a smaller business is that there can be considerable time and resourcing pressures.

In terms of the future, I hope to grow the NewGene business beneath me or possibly move to another organization at a similar or more senior level. There is much less of an established career structure in small biotech, which means you are more of the master of your own destiny, but it can also make long-term planning difficult.

My advice for anyone interested in a career in *in-vitro* diagnostics is to check out the websites of the Bio Industry Association (BIA) and British In Vitro Diagnostic Association (BIVDA). Send out some speculative applications and pick projects that sound interesting. Try to be flexible and don't be too shy!"

Clinical biochemistry

Clinical biochemistry is the study of the molecular basis of diseases. A clinical biochemist is a laboratory-based professional responsible for performing diagnostic analysis of physiological samples. Using automated systems, clinical biochemists carry out tests on blood, urine, tissues and other biological samples to diagnose various diseases. Clinical biochemists can also perform research to identify novel biomarkers or to develop new diagnostic tests for a particular disease. Other responsibilities include keeping protocols up-to-date, conducting periodic checks of equipment and assuring the quality of their investigations. In industry, clinical biochemists are generally employed by private sector diagnostic laboratories, pharmaceuticals and biotechnology companies.

Service providers

The service provider industry is composed of companies producing laboratory supplies and organizations offering laboratory services.

The products provided by this industry include laboratory equipment (e.g. pipettes, plastic-ware, centrifuges, spectrometers), chemicals and biological reagents (e.g. enzymes, antibodies, DNA). Everything that you find in a lab, in both industry and academia, will be produced by a service provider. Some companies also offer molecular biology services, such as DNA extraction, sequencing and genotyping, enabling researchers in small and medium-sized laboratories to access equipment they don't otherwise have and generating high-quality data.

Case study

DR KATHERINE LAU

Application Scientist at Renishaw

At 17, I got introduced to stem cells and wanted to be a stem cell researcher because of the enormous potential to use stem cell technologies to provide cures for a whole host of diseases. My first degree was in Biological Sciences and I specialized in Developmental Biology. I did an MSc in Biomedical and Forensic studies in Egyptology, which was a fascinating course. After my MSc, I realized that a PhD could help me further my career in science.

For my PhD, I worked on developing a novel method to identify stem cells involved in wound healing using vibrational (FTIR and Raman) spectroscopy. I then started working at Renishaw plc as a Raman spectroscopy application scientist, specializing in life sciences applications. I was particularly attracted to my position as they were looking for someone with biological sciences and vibrational spectroscopy knowledge. I get to combine all of the skills I have previously acquired, put them to use and also contribute to business development and marketing.

I have several main responsibilities in my role: developing new applications, marketing, assisting sales, training and product development. I carry out research to demonstrate how Raman spectroscopy can benefit life sciences research. I work to help make sense of the biochemical information obtained by Raman spectroscopy for biological research. In addition, I generate promotional literature, such as videos and flyers, for our sales team to use, and also advise them on how to approach customers in the life sciences arena.

By understanding both the biologists' language and the engineers' requirements, I can help bridge the gap between the end users and the engineers. I enjoy most aspects of my job, in particular the research and collaboration elements. I like that I can use my scientific knowledge and analytical skills. I also enjoy presenting my results at conferences and promoting the benefits of our technologies. I am in a great position to go out and exchange ideas with our engineering teams to make things happen. It is also great to travel to different countries with work as I get to see places that I would otherwise not have thought about visiting. In addition, I enjoy learning about the commercial aspects of the spectroscopy business.

My advice for those wanting to move into the field is to talk to different people in the industry at shows or conferences to get more insiders' insights. Getting experience in scientific techniques and using opportunities to polish your presentation, scientific writing and time management skills will be an advantage.

Biomaterials and biotechnology

Biomaterials are substances (other than drugs) which can be used to treat, increase or replace tissues, organs or body functions.

As healthcare and life expectancy improve, developing technologies to keep us healthy and functioning are increasingly important. Biomaterials can be used to repair, regenerate or replace parts of the body and they could revolutionize medicine. Examples include hip replacements and prosthetic limbs. There are many different areas of research depending on the product being developed (Table 1).

Other branches of the biotechnology industry include plant biotechnology or biofuels.

Table 1: Overview of research areas in the biomaterials industry

BIOMATERIAL RESEARCH AREA	BRIEF DESCRIPTION
Drug delivery	Biomaterials are used as specific drug delivery systems
Tissue engineering	Tissue engineering aims to repair damaged tissues by combining cells with scaffold biomaterial, which guides the growth of new tissue
Artificial organ	A synthetic device which replaces a natural organ
Prostheses	Artificial body parts
Implants	Synthetic materials to replace or support a biological structure
Surface modifications	Alteration of biomaterial properties to maximize its performance
Bioadhesives	Biomaterials acting as adhesives

Plant biotechnology

With the world's population increasing at a high rate, ensuring that there is enough food available in the future is essential. Scientists in the plant biotechnology industry work on increasing the amount of food produced, growing food in poor conditions and making food more nutritious.

Biofuels

Finding alternative sources of fuels and materials that are sustainable, renewable and generate low carbon emission is a priority for our future. Biofuels research focuses on finding and utilizing enzymes or micro-organisms to convert plants and waste products into renewable fuels.

Agrochemicals

The agrochemical industry researches and produces pesticides and fertilizers. Because of the current demand for more food, especially in the Asia-Pacific area, the agrochemical industry is steadily growing and is expected to reach a value of $261.9 billion by 2019*. Its products, used in agriculture, floriculture and horticulture, increase food production and help to meet the demand for grains, cereals, fruits and vegetables of the growing population.

PESTICIDES
Substances that repel, control or destroy any types of pest to protect plant products.

FERTILIZERS
Materials that are applied to the soil to supply essential nutrients for plants growth.

* Source: Luncitel, Global Agrochemicals Industry 2014-2019: Trends, Profit and Forecast Analysis, June 2014

Case study

SAMANTHA HALL, Technical Specialist at Syngenta

I must have been a really annoying child, constantly asking why and wanting to know how everything works! I've never not liked science. My earliest memories are of wanting to be an explorer. I love to discover new things. As I reached A-level, I wanted to be a Pathologist or Forensic Scientist and my study choices were chemistry, biology and mathematics. Looking back, I think I wanted the excitement of new discovery combined with wanting to help people in some way. I managed to take a tour of the pathology labs of my local hospital and even attended a forensic science conference during a summer break. I went on to study Pathobiology at undergraduate level at the University of Reading. The course was essentially a disease focused biological sciences degree with a foundation in chemistry and a term spent at the Royal Berkshire pathology department during the final year. I came to realise that I was too emotional to deal with death all day and didn't like the idea of routine lab studies. Fortunately, my undergraduate project was a real source of inspiration. I thoroughly enjoyed experimental design and testing the mode of action hypothesis of a widely used compound. After graduation, I applied to every chemical company within a 25 mile radius. I was very fortunate and one of my speculative application paid off. I've been working for Syngenta for the last 16 years. Syngenta is a leading agriculture company helping to improve global food security through world class science and innovative crop solutions, employing 28,000 people in over 90 countries worldwide.

My career began as a technician where I gained wide experience of a variety of techniques, such as cell culture, cell-based reporter assays, radioligand binding and enzyme assays, protein production and assay development skills. I soon progressed through to a senior scientist, then on to a technical specialist role reporting directly to lead generation and optimisation projects. The project teams are multi-disciplinary with expert representation from various science and non-science disciplines. My main objective is to determine the mode of action of new fungicides and support the design of new products with structure-activity-relationship information. Mode of action research is thoroughly rewarding with new challenges appearing frequently. Science never stops evolving. I'm still asking why and learning new things daily. My role is both office and lab based.

Food formulation

Attention to consumer trends, food policies and government regulation are fundamental to the food formulation industry. Currently, low-sodium, environmentally sustainable and "free from" foods, such as gluten-free bread, lactose-free yoghurt etc., are all popular with consumers and this drives additional food formulation activity in these areas. It is crucial for companies to keep up to date on what types of food and drink customers prefer and change their formulations accordingly.

Case study

DR KEVIN HUGHES
Research Manager, WALTHAM Centre for Pet Nutrition

I was always interested in Science at school, understanding the biological world and exploring the unknown; entering into a science based career was always my first choice career.

Following my A-levels, I studied Biochemistry at the University of York. During the second year summer break, I secured a 10-week placement job working for AstraZeneca in their drug discovery program. This experience was invaluable and I would strongly encourage anyone to be active in seeking out such development opportunities.

I subsequently studied part-time for a PhD in molecular biology at the University of Nottingham whilst working as a research technician; both involved studying various aspects of gut health and function in humans and rodents. Working part-time enabled me to have a much broader exposure to the science, but this route is not for everyone because you need a very strong work ethic to balance these differing priorities effectively. Nevertheless, that early exposure to prioritization is a skill I leverage every-day in my current role, so was instrumental to my development as a successful researcher.

After my PhD, I worked in post-doctoral and senior post-doctoral roles at Nottingham and the University of East Anglia. During this time, I was very deliberate to choose posts where I continued to work in the field of gut health, thus building up a significant breadth of expertise in the area with a view to achieving my longer term ambitions of being a leader in that field. During this time, I also volunteered as a safety officer and laboratory manager to further my development. The experience I gained was instrumental to my career progression, although not easy to balance the work-load. Nevertheless, I take the view that sometimes you have to be prepared to go above and beyond to build the skills sets required to succeed in a very highly competitive industry.

My current post is at the WALTHAM Centre for Pet nutrition as a research manager in digestive health, where I am able to leverage that breadth of experience.

In my view, there are a number of crucial enablers for a successful career in science.

First and foremost, you need to be able to deal with ambiguity and be inquisitive. You also need to accept that experiments will fail and learn to live with and harness those frustrations in a positive way. This requires mental strength and the ability to seek out sometimes non-obvious solutions. In order to broaden your expertise, you must be prepared to be mobile; staying in one lab for too long is unlikely to give you the breadth of expertise and experience that you need to succeed. Be prepared to take on responsibility and be intentional about those choices to maximise your development opportunities. Finally (not unique to science, but probably more heavily weighted in this sector), ultimately you need a little bit of luck. You may be one of the select few who find themselves in a high performing lab where results and the publications needed to progress come easily. For most of us however, you need to harness that positive attitude to your work and drive your own development, thus engineering your own luck to help you progress.

Working in industry

Each of the industry areas outlined in this guide offers many positions that are suitable for people who have studied and trained in biochemistry. The roles include entry level positions, graduate schemes, graduate jobs or more specialized positions.

Apprenticeships

Apprenticeships, higher level apprenticeships and degree apprenticeships offer the opportunity to train on the job, earning a wage while developing new skills. As an apprentice you'll work alongside experienced staff, gain job-specific skills, earn a wage and get holiday pay, and get time for study related to your role (usually one day a week).

Apprenticeships take 1 to 5 years to complete depending on their level and in some cases you can gain an undergraduate or postgraduate degree by completing an apprenticeship.

Roles such as laboratory technician, laboratory scientist, project manager, science manufacturing technician, pharmaceutical apprentice dispensary assistant, medical laboratory apprentice and many more will all involve biochemistry skills.

Entry requirements will vary depending on the level of apprenticeship.

Graduate schemes

Graduate schemes are training programmes providing a route for graduates into a certain profession. Their aim is to develop technical and transferable skills but also area-specific industry knowledge. Graduate schemes are highly competitive and the majority of biosciences training programmes are offered by the pharmaceutical industry in many sectors.

Examples from the R&D and Manufacturing area include:

- **Innovative Medicine and Early Development Drug Discovery**
- **Drug Design & Selection**
- **Pharmaceutical Product Development and Supply**
- **Vaccines Development**
- **Vaccines Manufacturing Quality**
- **Supply Chain**
- **Regulatory Affairs**

Graduate schemes vary in length, with a contract of generally two to three years, and involve rotations in different departments, to provide the trainee with a breadth of knowledge and technical skills. During the schemes there are opportunities for training, personal development, gaining additional competencies such as leadership skills and learning about the company's values and expectations. Some schemes may even comprise academic or professional qualifications.

Entry requirements may vary, but usually companies ask for a 2:1 from your degree and a strong academic track record. Other necessary competencies are communication, time management and critical thinking. Practical skills are desirable. There is a yearly deadline, so make sure you start your application in plenty of time before your graduation.

Graduate jobs

Graduate jobs do not generally require any previous experience and can provide a great start point for your career. During this time, training will be provided and your development will often be guided by experienced mentors in the team. Alongside a degree, requirements for graduate jobs include common competencies such as communication, organizational and problem solving skills. Remember that, even if you have never had a full time job, these skills could have been acquired during a placement, holiday job or in your academic years. Practical skills developed during your degree may be an advantage.

Professional jobs

Professional jobs require previous experience in the field and/or higher qualifications, such as a Master's degree, PhD or professional registration. For laboratory-based positions, excellent practical skills are necessary, as well as a deep understanding of the field of interest. Additional essential competencies include a good attention to detail, research skills and evidence of innovation.

A range of companies accept speculative applications, so contacting them with a CV and a cover letter may be a good idea.

Non-laboratory based jobs in biosciences

Other roles available in industry for biochemistry graduates include, for example, scientific sales jobs, such as medical devices representative and equipment sales consultant. In addition to a strong scientific knowledge, these types of jobs require excellent communication, interpersonal and networking skills. Entry level jobs are available for graduates and some companies offer graduate sales trainee programmes.

Skills and work

Studying biochemistry provides you with a great skill set and knowledge base to enter many different careers. Choosing a career path is not a decision that you make once in your lifetime. As you move through different jobs, gaining and developing knowledge and skills, you may reassess which direction you wish to take. To help focus your search, it is important to evaluate both your experiences and transferable skills, remembering that you are unique in what you can offer to a company.

Relevant work experience can help develop specialist skills and knowledge and enable you to see whether you enjoy a particular job role or field. It will also equip you with a good base of experience to reference as examples of work in answers to interview questions. Finding work experience can be challenging, but talking to your nearest careers service and looking online for internships or placements is a good place to start.

Approaching smaller companies and showing interest in work experience may be easier than with larger organizations, so research the companies near you and be proactive. However, any work experience, such as a part-time job during your holiday, still provides you with invaluable skills that you can apply to any job role.

Transferable skills are those which can be used in more than one job role or setting. These skills are often listed in job descriptions, sometimes referred to as competencies, and certain key skills are required frequently. Therefore, it is important to understand the meaning of these skills (Table 2) and show an employer that you have them.

At every stage of your career, consider which skill or aspect of your job you enjoy the most. Guiding your career to suit both what you like and what you are good at will make it a more rewarding experience and you will be more likely to excel. Your career path is not fixed, and this is why an understanding of transferable skills will enable you to change and develop your own path. In biochemistry, competencies are fundamental to successfully transitioning between academia and industry or other work environments.

Future career paths

Your career and the path it takes will be unique to you. From the basis of biochemistry, you have the potential to excel in industry, possibly becoming the head of a research department, or even your own company. As you progress you will gain skills and knowledge that you can lend to companies in the form of consultancy, seminar or outreach work. If you choose to move away from the laboratory, the transferable skills you develop, and possibly additional qualifications, will allow you to apply for communication, marketing and sales, management and finance roles, to name just a few. Your potential and the opportunities open to you are far-reaching and biochemistry is a great starting point.

Table2: Description of transferable skills and how to evidence or develop them

COMPETENCIES	DESCRIPTION	EXAMPLE(S)
Communication	The transfer of information, verbal or written. An important part of communication is also listening.	Customer service roles, working on a student newspaper/blog, writing reports, presenting research.
Problem solving and creativity	Ability to think outside the box and creatively approach a task to successfully complete it.	Developing new procedures to streamline a project, finding a solution to a problem in the laboratory.
Analytical and research skills	Ability to think critically, analyze and assess information and collect data.	Writing critical reviews and laboratory reports, final-year project in the lab.
Proactive thinking and self-motivation	Ability to anticipate difficulties and take action without instruction at every step.	Timely submission of an assignment despite unforeseen circumstances.
Leadership and management	Ability to manage and motivate a team to meet targets and deadlines.	Being the president of a society, of a social or musical group, being a sport team captain.
Teamwork	Ability to work well with others, being reliable, and supportive.	Group assignments, being a member of a sports team or a university society.
Planning, organizational and time management	Ability to plan, manage and prioritize multiple tasks to complete them by a deadline.	Meeting coursework deadlines, organizing an event, combining a degree with a job.
Interpersonal skills	Ability to interact with a range of people in a professional manner.	Customer service job, being part of a team, outreach work within your community.
IT and technical skills	Confidence in using technology and specific scientific techniques.	Using Excel to manage budgets, lab experience.

Resources

You can find more information on careers on our website www.biochemistry.org/Education/Careers

General Career Websites

TARGET jobs
targetjobs.co.uk

Prospects
www.prospects.ac.uk

Milkround
www.milkround.com

The Job Crowd
www.thejobcrowd.com

New Scientist Jobs and careers advice
jobs.newscientist.com/en-gb

National Careers Service
nationalcareersservice.direct.gov.uk

Graduate Jobs
www.graduate-jobs.com

Apprenticeships, traineeships and internships
www.gov.uk/education/apprenticeships-traineeships-and-internships

Find an Apprenticeship
www.findapprenticeship.service.gov.uk/apprenticeshipsearch

UCAS
www.ucas.com

Find a Master's
www.findamasters.com

Find a PhD
www.findaphd.com

Drug Discovery

The Association of the British Pharmaceutical Industry (ABPI)
www.abpi.org.uk

British Pharmacological Society
www.bps.ac.uk

Jobs in the pharmaceutical industry
www.pharmiweb.com/default.asp
www.pharmafield.co.uk/jobs
www.carrotpharma.co.uk

Consumer Goods

Manufacturing jobs in life sciences
www.hays.co.uk/job/life-sciences-jobs/life-sciences-manufacturing
ckscience.co.uk/tag/manufacturing-jobs/
www.access-sciencejobs.uk/jobs/science-and-manufacturing-jobs

Diagnostics

British *In Vitro* Diagnostics Association (BIVDA)
www.bivda.co.uk/

Clinical Biochemistry

Careers in clinical biochemistry
www.healthcareers.nhs.uk/explore-roles/life-sciences/clinical-biochemistry

NHS Scientist Training Programme
www.nshcs.hee.nhs.uk/join-programme/nhs-scientist-training-programme

Health & Care Professions Council
www.hcpc-uk.co.uk

Institute of Biomedical Science
www.ibms.org/home

Service Providers

Association of Forensic Science Providers (AFSP)
www.afsp.org.uk/node/13

IPPRO Life sciences, service providers
www.ipprolifesciences.com/serviceproviders/serviceproviders.php?currentpage=2

Biomaterials and Biotechnology

European Biotechnology Network
http://european-biotechnology.net

Biotechnology Innovation Organization
www.bio.org

UK Biotech database
www.ukbiotech.com/uk/portal/index.php

Agrochemicals

Crop Protection Association
www.cropprotection.org.uk/what-we-do

Agrochemical jobs
agrow.agribusinessintelligence.informa.com/jobs
www.access-sciencejobs.uk/jobs/agrochemical/uk

Food Formulation

Food formulation jobs
https://jobs.foodmanufacture.co.uk/
www.yourfoodjob.com/
http://tastycareers.org.uk/jobs

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