

Attractive career avenues

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The Indian Biotech industry is in an expansion mode. Today a career in biotechnology is not just attractive but challenging and rewarding too.

Biotechnology is one discipline which finds applications in almost all areas linked to life. Modern biotechnology has advanced to gene technology and beyond, and is an interdisciplinary subject covering biomedical research, microbiology, physics, chemistry, mathematics and engineering. Realizing the diverse applications of the subject, an increasing number of students are opting for studies in the biotechnology discipline.

Buoyant industry

The fledgling Indian biotechnology industry has been posting good growth and has now attained critical mass. The industry has crossed the \$1-billion mark (Rs 4,745 crore) and recorded a 36 percent growth, according to the latest BioSpectrum-ABLE 2005 industry survey.

The biotech industry as it exists today can be divided into five major segments: Biopharma, BioAgri, Bioservices, Bioindustrial and Bioinformatics. During 2004-05, all the different segments have shown healthy growth patterns. BioPharma, the single largest contributor to the total business, registered close to 30 percent growth primarily driven by the vaccines business. The

Bio-Services market estimated to be Rs 425 crore recorded close to 54.6 percent growth. The BioAgri sector was the fastest growing one clocking nearly 150 percent growth. The BioIndustrial sector generated total revenues of Rs 320 crore registering 34 percent growth and the bioinformatics sector posted 25 percent growth to record a total business of Rs 100 crore. In additions there is the supporting BioSuppliers industry segment, which provides the necessary infrastructure to the biotech industry. This segment grossed a total revenue of Rs 1,230 crore and clocked 40 percent growth.

The subsequent pages will outline in brief the potential, scope, key qualifications and necessary skill sets required for each of these segments.

Diverse career options

Biotech professionals can be employed in the areas of planning, production and management of bioprocessing industries. Employment avenues are available in research laboratories run by the government as well as the corporate sector. At the starting level, students may find work in government-based entities such as universities, research institutes or at private centers as research scientists/assistants. Alternatively they may find employment in specialized biotechnology companies or biotech-related companies such as pharmaceutical firms, food manufacturers, aquaculture and agricultural companies.

New trends

These days financial institutions such as banks, venture capitalists, fund management companies investing in life sciences employ analysts who have a background in biotechnology and preferably an MBA as well. Local law firms are starting to show interest in biotechnology to provide advisory consultations for Intellectual Property Rights/Patent protection for life sciences and a person with a combination of biotechnology and law would be ideal for this area. Many biotech companies are appointing MBA biotech professionals to manage and oversee the business development programs of the company.

In addition, there are also opportunities for careers in biotechnology in organizations or companies that provide a supporting role for the biotech industry. Incubators are being set up in the biotech parks that are coming up in various states to encourage biotech start-up companies offer jobs for biotech graduates. Other government institutions/organizations that promote biotechnology, such as trade organizations also provide employment opportunities.

BioAgri Domain experts rule the roost

During 2004-05, BioAgri has been the fastest growing sector in the Indian biotechnology industry.

In the bioagri sector there is a huge opportunity for improving the agricultural productivity and quality. During 2004-05, the bioagri industry registered a growth of over 150 percent and the Bt cotton seed revenues crossed Rs 250 crore. Realizing the potential of the biotech applications in agriculture, many new agri-biotech companies have come up along with many traditional seed companies branching out. This has led to new career openings.

Today, instead of an all-in-one agriculturist, the field demands the services of specialists - plant molecular biologist, geneticist, biochemist, people specializing in functional genomics, proteomics, bioinformatics along with technical support and marketing staff.

Depending on the domain specialization of the company, the job categories vary and accordingly the qualifications required also differ. Dr Viloo Morawala-Patell, founder and CEO, Avestha Gengraine Technologies, a fully integrated biotechnology and bioinformatics company elaborates on the different job categories at Avesthagen, "These are technical, scientific, business development, administration, finance, legal, PR, clinical, product development and software programmers." The company recruits people with PhD and MSc for the science aspect of business and MBAs for business development and other management related positions, LLBs and also people specializing in patent law.

Another company in this sector is Nunhems seeds, a subsidiary of Nunza BV- a Netherlands based vegetable seed company, involved in research, production and marketing of seeds throughout India. The company has a separate biotech division to address the emerging opportunities in the agri sector and employs molecular biologists and tissue culturists. "We look for MSc and PhD degree holders in molecular biology, biotechnology, tissue culture and their main responsibility is molecular analysis of the material of both lab and field studies and maintenance of tissue culture plants," explained Dr Arvind Kapur, managing director, Nunhems seeds.

Monsanto India, an integrated agri solutions provider, broadly focuses on three areas—agricultural chemicals like herbicides, hybrid seeds and biotech/GM crops. The job categories in the company are sales, product development, marketing (brand management), breeders, hybrid seeds production and research and development.

Dr Mittur N Jagadish, director, Monsanto Research Center, Bangalore, observed, "Science and Technology is Monsanto's core strength and competence. We have a world-class research center in Bangalore, which is doing cutting edge technology. Our research spreads in datamining (informatics and bioinformatics), gene characterization, plant transformation, and crop protection." For the R&D division doctorates and post doctorates with domain specialization and relevant experience are sought. "Whereas in the sales division there is intake of candidates with diverse qualifications like MBA, MSc Agri, Bcom and PhD. Our main focus is not on experience but on the potential of the candidates to deliver and do the job. We focus on a diverse profile," said Dipankar Bandyopadhyay, HR manager, Monsanto India.

Companies like Indo-American Hybrid Seeds (IAHS) and Prabhat Agri Biotech have independent biotech divisions, which employs scientists and technical assistants.

In most of the companies the size of the core work team ranges from about 35 to 100. Taking the entire workforce into consideration (research, technical support and marketing), the ratio of manpower to women power is 8:1. But if the research section is seen alone then the ratio can be as high as 1:1. The salaries depend on experience, skills, quality and availability and it varies between Rs 6,000 and 50,000 per month.

In the near future, agri biotech will no longer be a discrete sector but will become an extension of the existing agricultural system and the industry will see a slow shift from chemical to gene-based solutions in agriculture.

BioPharma Largest contributor to biotech industry

With the focus shifting to R&D and manufacturing of biotech based drugs, it's good news for biotech professionals.

With the product-patent regime in place, R&D in the biopharma has been identified as one of the key growth drivers. Today the biopharma sector is the single largest contributor to the Indian biotech industry. Many new biotech-based pharma companies have come up and restructuring is the current buzzword in the traditional pharma companies. For Indian pharma companies, the major advantage of entering this market is the relatively short timelines needed to develop a product, tap the vast human resource available and bring the product at an affordable rate in the market. In fact, in view of escalating R&D costs in their home countries, many MNCs have set up branches in the country to gain the cost and time advantage.

Diagnostics, vaccines, and recombinant therapeutic proteins are the promising sectors of this industry. In 2004-05, the vaccine market accounted for the largest, about 47 percent share of the biopharma segment and therapeutics was the second largest contributor accounting for 20 percent of the total biopharma revenue. Diagnostics is still a nascent segment with companies like Bhat Biotech, Qualigens Diagnostics, Span Diagnostics, J Mitra & Co and XCyton Diagnostics bringing out innovative products.

Who are needed?

Dr SD Ravetkar, senior director, Serum Institute of India said, "The sector calls for professionals from various fields as biopharma is the cocktail of so many faculties-microbiology, biochemistry, molecular biology, immunology, chemistry, biotechnology and more. It requires candidates with diverse qualifications - microbiologists for the manufacturing process, biochemists for the down stream processing, immunologists for animal trials, biotech engineers for bulk manufacturing processes or process standardizing, etc."

The field requires people trained in new technologies with specialized skills, like immunoblotting, protein/genome analysis, western blotting etc. And in today's scenario candidates possessing these skills are rare. The responsibility and specialization of the individual will depend on the process, which he/she is handling - fermentation technology, downstream processing, proteomics, genomics, etc.

Dr BV Ravikumar, managing director, XCyton Diagnostics, believes there is a tremendous potential in the diagnostics sector too. He observed, "Cancer and lifestyle diseases are on an increase in developing world and developing nations. Cancer is the second leading cause of death in China. Spending on CVS and diabetes is three times the amount spent on all infections in India. Hence basic expertise in diagnosis, which includes biochemistry-blood glucose, urea, cholesterol, liver function tests etc., based on organic chemistry and enzymology; microbiology-detection of bacteria, fungi and parasites based on microbiological isolation and identification; immunodiagnostics-hormones, cardiac diagnosis, cancer detection, drugs of abuse and infection detection based on antigen-antibody interactions and immunology; and nucleic acid testing-cancer detection, infection based on molecular biology, will come into prominence. So the diagnostic industry requires human resources for production (cell biology), for biochemistry (chemical engineers), for quality control (microbiology; molecular biology, cell biology), and for marketing (Clinically trained personnel)." An aptitude for trouble shooting is the requirement.

"Physicians have complicated requirements thus requiring application specialists," Dr Ravi Kumar added.

A common advice by pharma majors to aspiring candidates is to hone their skills. As, ironically on one side, the sector has a requirement of a large number of people and on the other hand there is an acute dearth of adequately trained students. Most of them do have a strong theoretical background but do not possess enough practical skills. Students need to gain hands-on experience in the new upcoming branches of science. Now a minimum work experience of two to three years is gaining priority and provides a crucial selection edge.

The salaries of researchers in pharma companies are appropriate, merit based and have begun to reflect the growing demand for skilled people. The growth potential for employees is good, as it is a nascent industry. Generally employees who perform well are sent for technology development training programs both in the country and abroad, like Serum Institute sends its employees to the US and UK for training in cGMP and production techniques.

As developing new biotech-based solutions has become the main focus area for the pharma companies, the demand for the scientists is expected to continue to grow.

Bioinformatics A niche area

Indian Bioinformatics industry has the potential to double its presence in the global market

The Indian Bioinformatics market, which is only 2.5 percent of the global market, has the potential to capture 5 percent of the global pie, according to a recent report prepared by the Confederation of Indian Industry (CII) and Department of Information Technology (DIT). To capture 5 percent of the global market, the industry would need to grow at a CAGR of 42 percent. And in keeping with this trend, a majority of the Indian Bioinformatics companies are planning to increase their scale of operations in this area, mentioned the report. According to the study, the total annual manpower required by the industry to achieve a growth rate of 42 percent would be 6,484 professionals in 2008-09 and 26,362 professionals in 2012-13. And in addition to the national demand, there would be a demand for Indian Bioinformatics professionals from rest of the world, which is expected to rise from 348 in 2003-04 to a total of 8,169 by 2012-13.

Presently, the industry attaches a lot of importance to the level of experience of a candidate and prefers experienced personnel to freshers. Though the opportunity exists, it should not be construed that bioinformatics is the next big thing. It is not and cannot be compared with the IT sector, say industry observers.

Bioinformatics, the amalgamation of biology and information technology, requires a range of "interdisciplinary skills". "The requirement here is to be able to have a good blend of computer scientists and life scientists working together and delivering solutions, which are the best of both domains, " observed Anuradha Acharya, CEO, Ocimum Biosolutions.

Bioinformatics companies generally have well-defined teams with a clear business focus. For instance, in Mascon there are three groups - a functional team that is the driving force of the organization and is built up of best of the domain experts. A development team that is the supporting bone of the organization consisting of software professionals. And a business development team which is the source of momentum of the organization carrying the domain experts with specific industry experience. Other companies like SysArris have domain experts who have expertise in genomics, cheminformatics and other areas.

Besides the basic qualification (a masters or higher degree in a branch of life science or computer

science), prior experience or training in the industry or research organization is an added advantage. But the experience required would depend on the openings from time to time. As such, bioinformatics being a new field, it is very difficult to get people who are cross-functional. Hence companies generally provide training before putting the candidate to work.

The salary range depends on the experience and capabilities of the person and performers are recognized and well-rewarded. "While the starting salaries could be anywhere from Rs 10,000-20,000 depending on the experience of the candidate, it can go up very high as there is a review every six months," said Anuradha Acharya.

This interdisciplinary field is a valuable tool to solve the problems encountered by life scientists while dealing with complex biological systems. It has tremendous potential and scope as it moves hand in hand with various disciplines of life sciences.

BioServices An outsourcing hub

Contract research manufacturing has evolved into a huge market.

The CRO segment in India mainly consists of contract research, contract manufacturing and clinical trials. The Indian market has companies doing clinical research and trials for the molecules developed in-house (captive CRO) like Eli Lilly. And there are organizations doing contract research and trials for other companies (independent CRO) like Quintiles Spectral, SIRO Clinpharm and Syngene. Aurigene, Shantha Biotechnics and Chembiotech are some of the other important companies. Syngene International, a Biocon group company, set in 1994 was India's first integrated CRO in the area of drug discovery. It is presently serving over a dozen pharmaceutical units in Europe and the US.

"Market trends indicate that the CRO market is going to experience rapid growth in the coming years and will become an indispensable part of the drug development process. The CRO industry is a major employer of medical and scientific staff and hence the demand for qualified personnel is on the increase.

Dr Krathish Bopanna, Chief Technology Officer, Manipal Acunova, Bangalore, informed, "India is becoming a hot destination for clinical research. Clinical trials in India are growing at a 60 percent AAGR and crossed \$100 million in 2004. By 2010, the industry will spend over \$300 million on clinical trials in India. There are already 20 CROs like Quintiles and Manipal Acunova which offer Phase I to IV trials complying with ICH-GCP guidelines. With 80 hospitals serving as sites for clinical trials, India is emerging as one of the fastest recruiter of subjects across the world. So there are endless possibilities." With very rapid growth in number and size of companies, the spectrum of skills required is in scarcity. Bopanna added, "Lack of specialization, limited pool of experienced people, cross functional approach and new emerging platform technologies and convergence of disciplines are some of the reason why skilled training will be needed. Adaptability and flexibility are the key factors that drives this business opportunity."

"In the contract industry, the people should be highly skilled and versatile to take up different projects and execute them at low cost in order to be competitive and effective," opined Raman Akella, head administration, Shantha Biotechnics, Hyderabad.

Courtesy: Dr Krathish Bopanna

In any CRO the job categories depend on the nature of the contract service undertaken. Scientists in the field of synthetic organic chemistry, molecular biology and bioinformatics are required at Biocon. Aurigene looks for screening pharmacologists, chemical researchers and experts in the field of genomics, computational biology and bioinformatics when the project is in the initial stages of drug discovery. A few job categories at Shantha Biotechnics are fermentation, purification/process analysts (technical), quality assurance, registration/documentation personnel (regulatory), plant and process, quality assurance, operations personnel (management) and medical advisors.

Projected growth of the Indian clinical research industry

Resources	2010
Clinical research market	\$1.5 Billion
GCP Studies	1,500-2,000
GCP trained investigators	10,000-15,000
Subjects required	2,00,000-3,00,000
Clinical research professionals	50,000

Source: McKinsey Report

"Clinical trial is a very data and quality intensive work and may involve high percentage of travel. The scope of any error is very limited and involves high degree of ethics both personal and professional," commented Rajiv Gulati, managing director and chairman, Eli Lilly and Company (India). In this segment growth prospects are excellent and are performance-related. The salaries are very attractive and much above the average salaries in the medical sector or pharma industry.

BioSuppliers A growing market

The sector is abound with opportunities for people from diverse backgrounds.

This sector offers good career opportunity for graduates/post graduates with bio or chemical engineering background with a couple of years of experience in a lab or industry. Depending on whether the company is dealing in generic or high tech products, equipments, consumables, disposables, etc., the profile of required candidates may vary from company to company. As Dr P Babu, director, Bangalore Genei, aptly puts it, "BioSuppliers could be both trading companies and manufacturers. Further biosuppliers could be based on the nature of equipments/instruments or reagents, enzymes etc., so it

is difficult to group all the biosuppliers together. The segment is more niche unlike biopharma/bioagri."

If the company is primarily into manufacturing, like Alfa Laval, which is one of the leading manufacturers of engineering equipments and supplier of complete plants then the main job functions will be pre-engineering of the processes and products, preparing specifications and drawings, procurement and execution of projects with documentation. Accordingly, the company will look out for chemical/biotech engineers. Similarly if the core competency of the organization is making reagents, diagnostic kits, enzymes, etc., then it will require candidates possessing post graduation or doctorate degree in biochemistry, biotechnology, microbiology or related life science fields. And if the company is a distributor of biotech products, then it will require candidates having sound technical knowledge about the products along with strong sales and marketing background.

Cambrex Chemicals, a 100 percent subsidiary of the US-based Cambrex Corp., assists the biotech industry in maintaining its product quality and also supplies ingredients used by the research institutions to develop new products. "The job categories are business managers, technical service managers, etc. We require graduates with a basic biological background and any additional qualifications would add value. The candidates should possess integrity, team-playing capability and the ability to work independently," said Vivek Varma, business manager "biotherapeutics, Cambrex Chemicals.

"At Genetix the job categories are business development executives, product specialist and customer care representatives," said Arun Prakash, CEO, Genetix. The company offers marketing and technical support to biotech and life sciences companies. "The qualifications required are MSc (for business development executives), PhD for product specialist (men/women), graduates with computer skills for customer care representatives (women)," he added.

In Amersham Biosciences, now a part of GE Healthcare Systems, the different levels of jobs throughout the organization range from product specialists, area manager, product manager, sales manager, application specialists, service engineers and service managers. "We have defined key responsibilities and accountability for each position/functions. For example, a salesperson or product specialist would assist in product management, key account management and be responsible for organizing seminars and demonstrations for the customer. Good communication skills, teamwork, self-motivation, perseverance, technical skills and a positive attitude are a few things we look for in a candidate. Candidates with exposure to the western scientific arena are also welcomed," said senior managers of the company.

In general, the companies require candidates with a MSc or PhD degree in bio-related fields like molecular biology, biochemistry, chemical engineering, etc. A couple of years of either sales experience in a similar company or a couple of years of research experience in a lab or industry helps since most of the companies are technology-intensive. Specialization in a particular area is a definite plus. In fact, the trend is towards higher educational qualification in addition to basic sales and marketing skills, as the companies believe in not just selling a product but in helping the customer complete his entire research process successfully using their respective products. Therefore, it is essential for the employee to have a scientific mind and a good rapport with the customer.

The growth potential for employees is excellent. Plenty of opportunities are available for growth within India and abroad too.

Rolly Dureha