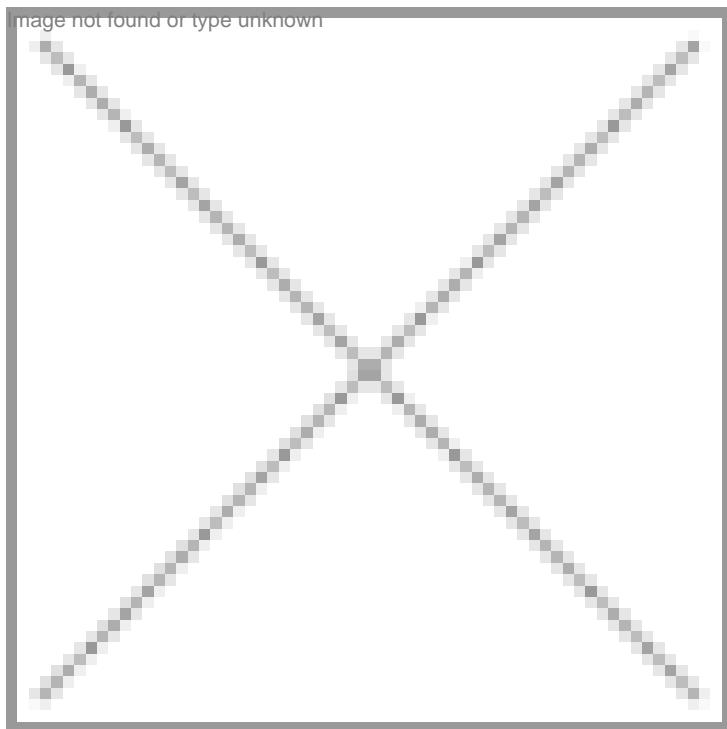


## Biotechnology: The Choice for Your Future

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The Indian biotechnology industry currently employs about 10,000 and this figure is expected to double in the near future. Other than the domestic demand there is also a high demand for human resources in the international market. The international community is aware of Indian skills. The country has trained and supplied high quality human resources and scientists for US universities and biotech industry, who are the world leader in the research, development and commercialization of biotechnology products.

Because biotechnology essentially uses the basic ingredients of life to make new products, it is both a cutting-edge technology and an applied science. Its application can be used in any industrial sector that works to improve the quality of life such as to produce modified crop plants, livestock, proteins, vaccines, and drugs. So the scope of career opportunities in biotech-related fields is tremendous.

Many Indian companies have already ventured into the different fields of biotechnology such as bio-informatics, biopharmaceutical, bio-agriculture, human genetics and genome analysis, vaccine research and development, etc. The job opportunities could range from research and development to production and marketing.

“The beauty about biotechnology industry is that it has multifaceted recruitment unlike software industry, which needs only homogenous skill,” says Kiran Mazumdar Shah of Biocon, the leaders in Indian biotech industry. There is an enormous career opportunity here right from microbiology to chemical engineering, from mathematical computational modelling to software development, from regulating to patenting. “Today one can focus just on biotechnology patents. If

you are a good lawyer and have a background in scientific knowledge you can become a very good patent attorney. A company like ours has biologists, chemists, genetic scientists, microbiologists, mechanical engineers, chemical engineers, electrical engineers, regulatory people, doctors, lawyers and so on. This shows the huge potential of the industry in generating various kinds of jobs.â€?

To prepare for a career in biotechnology, a person should have a firm base in biology, chemistry, and other life sciences. Post graduation, doctoral qualification in biotechnology offered by universities and other institutions can lead to placements in the research laboratories run by government and corporate sector other than those avenues in the industry. The multinational companies, with the pharmaceutical and chemical industry in close lead, offer the best remuneration packages. With a number of companies launching foray into biotech industry, the business is growing at an accelerated rate. And the compensation is too competitive in comparison with software industry and includes incentives, such as stock option plans, company-wide stock purchase plans, and cash bonus plans.

## **Bioinformatics**

Bio-informatics is perhaps the hottest area in the biotechnology world. An acronym for biological informatics, it is an integral component of this new science. It is the application of computation to the field of biology. Further elaborated as a science of collecting, storing, searching, annotating, modeling and analyzing biological information, that involves a range of activities from data handling, publication to data mining and analysis.

Estimates say that there is a global shortage of one million professionals in bio-informatics. This shows the tremendous scope in this particular field alone. And the presence of a world-class software industry in India keeps the country on a brighter side for global investors in bio-informatics.

The Department of Biotechnology under the Ministry of Science and Technology, Government of India has taken a lead R&D of this sector. Significant funds have been granted to universities and informatics networks for it. Tata Consultancy Services (TCS) has been assigned to develop an integral software package for bioinformatics, with the support of 18 institutions under the Council of Scientific and Industrial Research (CSIR).

Many of the leading biotech firms have started tying up with leading institutions to train people in this field. Ocimum Biosolutions, one such company dealing with bioinformatics solutions, offers six months training programme in partnership with the Michigan Technological University. â€œThis is rather rigorous course and only about 10-15 students are selected for training. We absorb about 40 per cent of them in-house,â€? says Anuradha Acharya, CEO, Ocimum Biosolutions. â€œWe have placed almost all our students in India and abroad,â€? adds she.

Sys Arris Software Private Ltd, a leading software solution provider for the life sciences industry is to set up a centre of excellence for bio-informatics at PES College of Pharmacy, Bangalore. â€œThe centre of excellence will help M. Pharm students to get exposure to the industry needs and will make learning more effective,â€? says Prof. MR Doreswamy, Founder Secretary of PES institutions.

**â€œIt is very much important to get the right kind of training if one wants to really succeed in this field,â€?** says Anuradha Acharya, CEO, Ocimum Biosolutions. Biotechnology should be an important component of biotechnology education. It has far wider scope that it is now projected. But it should be looked at with a clear perspective. â€œWe should see bioinformatics as the domain of biology and not of information technology,â€? says Dr. Seetharam Annadana, coordinator of Wagningan University, Netherlands, in India. The university offers online courses in a) Recombinant DNA technology b) Bioinofrmatics 3) Process engineering with special emphasis on R&D and genomics. The Wet laboratory at the St. Josephs Institute of Gene Technology provides practical training for the students doing the courses.

Bio informatics as a field of study is becoming increasingly important due to its role in genome sequencing projects in the biotechnology sector. This leads it shrouded in a lot of hype concealing the ground realities in the field. This has led to the mushrooming of educational institutions in this field, as happened in the software. Most of the big companies in the industry, both in the government and corporate sector, complaints about the ill-trained graduates coming out of these institutions. â€œMany people claim to have done some course or the other, but most of them don't have a grip on the subject,â€? says Anuradha Acharya. She says that there is always a dearth of talented professionals in this informatics area. â€œIt is very much important to get the right kind of training if one wants to really succeed in this field,â€? she adds. A curriculum needs to be developed keeping in mind the needs of the industry.

## Biopharmaceuticals

India has a vibrant pharmaceutical sector in the country. "Bio-pharma has a very important role to play and that is going to be the highest growth area," says Kiran Mazumdar whose main focus is into pharmaceuticals. Success stories in the sector has forced pharma majors including Dr Reddy's Lab. and Ranbaxy to foray into the field. The bio-pharma products are becoming the most powerful pharmaceutical agents for some of the deadliest genetically linked diseases and cancers.

The worldwide pharmaceutical market is expected to reach US \$3 trillion by 2020, which was \$317 billion in 2000. It is obvious that the biotechnology in the health sector is a serious industry and not just hype. It is knowledge based industry and the complexion keeps changing with newer breakthroughs, giving lots of job opportunities. Wockhardt, Ranbaxy, Shantha Biotech and Biocon are the leading companies in the Indian industry.

**We need to have more training centres like IITs, says Varaprasad Reddy, managing director, Shantha Biotech, Hyderabad.** According to Kiran Mazumdar, India with its scientific manpower has a vital role for global success in biotechnology and pharmaceutical R&D. However, we need to harness this talent in an enabling business environment with a pragmatic, entrepreneurial mindset. Students passing out from our institutions and universities lack practical training as most of the institutions don't have proper infrastructure. We need to have more training centres like IITs," says Varaprasad Reddy, managing director, Shantha Biotech, Hyderabad. Shantha Biotech, which mainly focuses on research and development in the bio-pharma sector, has about 394 employees. The company trains the new comers to improve in technical aspects and also in improving the soft skills.

## Bioagriculture

Agriculture is another key area that Indian biotech industry is looking at. The country offers a huge market for agribiotech products, as India's economy is still heavily dependent on agriculture. This, combined with excellent scientific infrastructure in agriculture, rich bio-diversity and skilled and low cost human-power, makes it a haven for investments. Also, the increasing productivity on the existing land becomes essential in order to ensure future food security for the growing population. "Bioagri is a boon to the country to fulfil its domestic requirements in food grain sector," comments Krishnappa, vice-chancellor, University of Agricultural Science, Bangalore. The university has got a department dealing with biotechnology and presently 16 students are pursuing the biotechnology course at the department. Though there is demand from the student community to increase the number of seats, lack of infrastructure does not allow this. "It is difficult to run the show due to lack of funds and support from the government," says the vice-chancellor.

The transgenic technology has recently attracted attention with the approval of Bt-cotton. High yielding genetically modified (GM) pest resistant crops would give a new lease of life to the suffering farmers. The scope of job opportunities in agribiotech is also growing with the industry. The skilled manpower required in this sector is more than in any other sector. "Whenever there is a need of intellectual labour in international market, the global market looks at Indians," says Deepak Mallik, CEO, Advanta India Ltd, which is into agri-biotech.

The scope of biotechnology related fields are not complete with these sectors. But there is a dearth for well-trained professionals in this multidisciplinary field. There are a number of universities and other autonomous institutions coming out with various courses to meet this need. But it has got a negative side. "There is a serious problem with the mushrooming of institutions in biotechnology," says Kiran Mazumdar. "Education is very important and if the correct type of education is not provided that will seriously impact on the quality of people coming out of these institutions," she says. She suggests that there is a lack of teachers in the field. The government should first allocate a budget to train teachers in the field rather than announcing new colleges and courses. "Even the first rank holder of a university when interviewed doesn't know the differences between yeast and a fungus. This is the kind of standard that our students have," she comments.

So if you are serious about a career in the science of the century you can make a choice of Biotechnology. So if you are serious about a career with the new science of the century, take up a course, which has a syllabus in tune with the industry standards like IBAB. "They give a good training to students. We are absorbing some of their students through campus recruitment," said Kiran Mazumdar.

Roby Ajith