

Landeshauptstadt Dresden

Living science Biotechnology in Dresden

Services provided by the Department of Economic Development

- Approval management
- Real estate management
- Promotion of business start-ups
- Contacts with research institutions and networks
- Location marketing
- Lobbying

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Dresden is a biotechnology location that offers investors a lot of advantages. Here, a lively and varied research network has evolved within a very short time period: Max Planck institutes, Leibniz and Fraunhofer institutes cooperate closely with the Technische Universität Dresden. The Free State of Saxony provided generous financial assistance to the BioInnovationsZentrum, which unites research and business ventures under one roof. More than 1,000 jobs have been created during the past four years.

A distinguished location

This rapid growth is the result of Dresden's development into a research hub of top international repute. Moreover, Dresden is situated in the middle of Central Europe, where the growth potential is huge compared with existing locations in this field. The attractiveness of the location is exemplified by the success of the International Max Planck Research School for Molecular Cell Biology and Bioengineering, a joint program of the MPI-CBG and the Technische Universität Dresden. Only four years after its initiation, this has become Germany's greatest structured program for doctoral candidates and a top address in Europe.

So the main points in research and assistance to young scientists are the purposeful networking of disciplines, a focus on bioengineering, and the strengthening of medical areas such as tissue engineering, adult stem cell research or regenerative medicine. Efficient methods of technology transfer have therefore been part of the concept from the beginning, facilitating the quick and successful transfer of innovations from research into businesses. We hope that this unique constellation of engineering sciences and top-level bionanotechnology will create a link with nanoelectronics to secure Dresden's leading role as a computer-chip center in future through continuing innovation.

Prof. Dr. Kai Simons
 Director of the Max Planck Institute for Molecular Cell Biology and Genetics and President of the Committee of BioMeT e.V. (Registered Association) Dresden

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Quick, efficient and without red tape

The Department of Economic Development assists Dresden's development as a biotechnology location through a number of activities, e.g. by providing investors quickly and unbureaucratically with the sites they need to establish their businesses, as well as for extension and relocation projects. The BioInnovationsZentrum offers tailored offices and laboratories, as well as specific services to business start-ups, providing them with optimal conditions. The project coordinator, Dr. Sabine Matthiä, also works in the center. She assists investors in obtaining permits, arranges for the smooth and quick completion of all procedures and organizes contacts to the appropriate offices within the municipal administration.

It can be as quick as that

Special project groups ensure the unhindered start of investment projects. This has encouraged the pharmaceutical researcher-manufacturer GlaxoSmithKline, for example, to invest over 94 million Euro to double its influenza vaccine production capacity at its Dresden facility, the Sächsisches Serumwerk, by the year 2008.

Dresden as a meeting point

Trade fairs and congresses stimulate the productive dialogue between research institutions and businesses. With its International Congress Center, Dresden provides ideal conditions for such events, e.g. the BIO Europe 2005, the biggest European partnering conference for companies involved in biotechnology, pharmaceuticals and medicine. Every other year, young and creative scientists meet in Dresden at a conference of the European Life Scientist Organization (ELSO). Moreover, the Innovation Congress for Chemistry and Biotechnology as well as numerous medical congresses with more than 1,000 participants guarantee a vibrant exchange within the biotechnology landscape.



BioZ: latest infrastructure and sectoral service



AWD.pharma: packaging of medication

Innovative by tradition

The fundamental sciences of red biotechnology, such as medicine, biology and engineering, boast an impressive history in Dresden. The success story of the regional pharmaceutical industry that spans the last 120 years is particularly significant. The presence of these companies is of vital importance for our biotechnology cluster, because only they have the technical and financial resources to develop innovative ideas into marketable products.



APOGEPHA Arzneimittel GmbH:
tradition-rich company with modern facilities

Medicine from Dresden

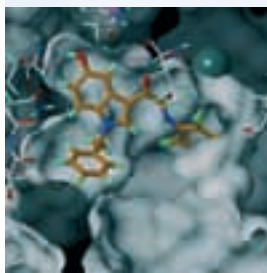
The name of Karl August Lingner, industrialist and founder of the Deutsches Hygienemuseum, is inseparably connected with this tradition. In 1911, he established a bacteriological department in his chemical laboratories, which became the nucleus for the foundation of the Sächsisches Serumwerk and the Institute for Bacteriological Therapy. Today, as a subsidiary of GlaxoSmithKline, Sächsisches Serumwerk is the sole development and production site for GSK's globally distributed influenza vaccines. APOGHEPHA Arzneimittel GmbH, specializing in the development and production of drugs in the area of urology, gynecology and cardiovascular disorders, is now proudly looking back on a company history spanning more than 120 years. The modern pharmaceutical industry was founded in 1874 by Friedrich von Heyden with the first commercial scale synthesis of salicylic acid. Over time, his Drogerie- & Färbewaren-Handlung Gehe & Co., founded in 1835, and the pharmaceutical company Dr. Madaus & Co., created the Arzneimittelwerk Dresden – today known as AWD.pharma, the largest pharmaceutical enterprise in Saxony.



The Sächsisches Serumwerk expands production capacities in Dresden for global export including US markets. Here, flu vaccine “grows” inside eggs.

Success on an international level

Innovative entrepreneurship today still characterizes the traditional pharmaceutical site. For example, elbion AG emerged 2002 from the research department of the Arzneimittelwerk Dresden and since then has been one of the top ten German research companies. In the spring of 2005, with the help of an international finance consortium, elbion AG concluded its first financing round of 35 million Euro and achieved one of the largest German financing projects in recent years. The approximately 100

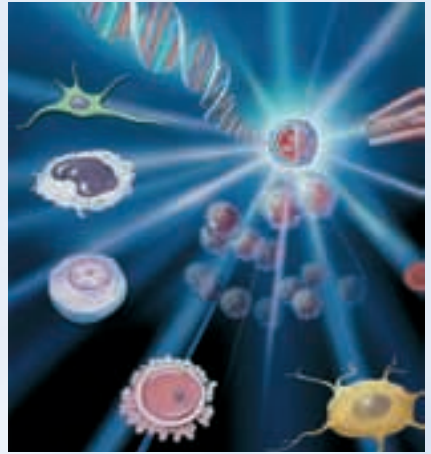


elbion AG: structure of a phosphodiesterase blocker in target protein PDE4

scientists of the company are able to call upon many years of international experience. They work on the development of drugs against disorders of the central nervous system and the respiratory tract – from the initial idea to phase II clinical trials. For the purpose of advanced development leading up to industrial production and worldwide marketing, elbion AG has entered into license agreements with leading pharmaceutical companies. The biggest international success to date: GlaxoKlineSmith purchased the exclusive worldwide rights for the development, certification, production and sales of the elbion drug AWD 12-281.



HEXAL Pharma GmbH develops technologies for transdermal therapeutic systems



TU Dresden: nationwide first special research area “From Cells to Tissue”, in which research is carried out on adult stem cells

Living Science

The interdisciplinary collaboration of various institutes, strongly application-oriented research as well as efficient networks provide a productive exchange between business and science.

Business enterprises are able to profit from this in special ways due to the high expenditure for biotechnological research and development.

■ Milestone for Dresden

A milestone on the road to a leading European biotechnology site has been the resolution of the Deutsche Forschungsgemeinschaft (DFG) (German Research Association), to establish a research center for “Regenerative Therapies” in Dresden. From here, a paradigm change in biomedicine has been initiated, away from the replacement of diseased tissue or the use of permanent implants. Instead, medical specialists, biologists, material scientists, engineers and information technologists are engaged in research to find out how the self-healing mechanism of the body can be stimulated so that, for example, diseased tissue is able to replace itself.

Business and science under one roof

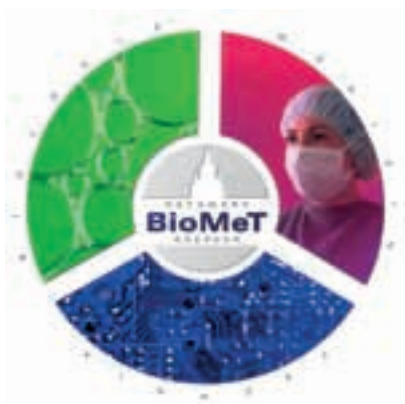
This exchange is particularly effective in the new BioInnovationCenter. Here, scientists and entrepreneurs work next door to each other. The joint project of the TechnologieZentrum Dresden GmbH and the Technische Universität Dresden (TU) offers a tailor-made infrastructure with modern offices, laboratories and conference facilities. One quarter of the floor space is occupied by six newly created chairs for biotechnology at the TU, while the remaining three quarters are available to biotechnology companies. These, in turn, not only profit from integration into Dresden networks, but are also able to take advantage of a unique, branch-specific service and technology platform, as well as competent advice, for example, in the field of marketing.



Max Bergmann Center for Biomaterials

Innovation by cooperation

Developing biotechnology into the second high-technology competence in the region is the stated objective of the network BioMeT Dresden. It combines the areas of biology, medicine and technology and connects more than 200 partners, among them 70 organizations in the field of life sciences. An outstanding idea! This assessment was shared by the Federal Ministry for Education and Research, which named BioMeT Dresden one of the winners of the nationwide InnoRegio competition held in 2000. The network received funding approval amounting to 24 million Euro. These funds are available to the Dresden region until 2006 to support research and technology-based products.



Wires from DNA molecules

Evidence of just how fruitful – in the truest sense of the word – interdisciplinary collaboration can be is provided by the research projects at the Max Bergmann Center, a joint project of the Technische Universität Dresden and the Leibniz Institute for Polymer Research. Aside from research of tailor-made materials for certain specific user requirements, the development of biomaterials for the IT and microelectronics industry is an important focal point of their work. These include, for example, organic polymers, which, due to their special characteristics, allow significantly smaller distances between conductors compared to conventional materials, and nanometer-thin wires made from DNA molecules to satisfy the ever increasing requirements in microelectronics. In addition, activities center around the development of biocompatible materials, biomineralization and the synthesis of biomaterials for medical purposes. The manufacture of bone implants is a particularly important example. For this purpose, bone cells are arranged on artificial moulds and stimulated to reproduce, mineralize and finally to form complete new bone segments.

■ Research and development

in the field of life sciences

- DFG Research Center
"Regenerative Therapies"
- Biotechnology Center of the TU Dresden
- Leibniz Institute for Polymer Research
Dresden e.V.
- Max Planck Institute for Molecular
Cell Biology and Genetics
- Max Bergmann Center for Biomaterials
- Medical Theory Center of TU Dresden
- Fraunhofer Institute for Material and
Radiation Technology
- Research Center Rossendorf e.V.



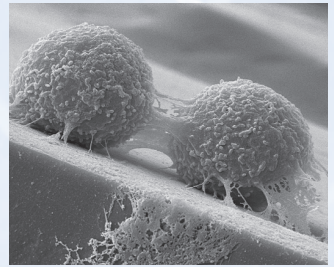
■ The environment is perfect

There are at least three good reasons for innovative biotechnology companies to settle in Dresden. Effective networks such as BioMeT Dresden and close proximity to clinics and research facilities like the Max Planck Institute are equally important site factors as is the open-mindedness of the population towards biotechnology. Finally, with its wide range of cultural offerings, Dresden is one of the most beautiful major cities in Germany.

In short: It simply is very attractive to live and work in Dresden.

Prof. Dr. Rudolf Fahrig

Managing Director, RESprotect GmbH



Max Bergmann Center:
top: structures of phenoxyl butyric acid
produced with a stick method are
suitable culture carriers for cell therapies
bottom: stem cells from bone marrow
on protein layer

Bio materials in medicine

Research is underway at the competence center for materials in contact with blood or tissue to optimize a method for the growth of stem cells from human bone marrow. These so-called adult stem cells are miniature all-round talents, because they are able to differentiate themselves from certain other types of cells, such as bone or muscle tissue. Therefore, with their help it is possible to cure diseases like leukemia, muscular dystrophy or paraplegia. In the project, scientists cultivate stem cells on synthetic surfaces, which have previously been wetted with proteins and in part have been charged with growth hormones. In the future, this method may even make it possible to influence the differentiation of stem cells directly inside the body of the patient. This means that it would no longer be necessary to implant tissue in the body, because the body itself would have the ability to grow its own replacement tissue with the aid of stem cells.



College for Technology and Business Dresden:
ornamental plant research in the field of landscaping

Specialists of tomorrow

The forward-looking branch of biotechnology needs highly qualified personnel. The excellent educational infrastructure in the region of Dresden offers ideal conditions for this and is one of the most important site factors. From graduation majoring in biotechnology to the dual education system for highly specialized laboratory assistants to the doctoral candidate program, a variety of tailor-made qualification models for future qualified personnel can be found in Dresden.

Biotechnology in school

At the Berufliches Schulzentrum (BSZ) (Vocational School Center) for agrarian sciences “Justus von Liebig”, high school students have been studying the subject of biotechnology for quite some time – for example, in animal breeding and plant cultivation, in the creation of plants resistant to diseases or in genetic farming. They are now able to obtain a high-school diploma majoring in biotechnology. The students, like all other students, learn in accordance with the Saxon curriculum and, after graduation, are eligible to study any subject at the university. The only difference: the first special subject – German, mathematics or a foreign language – is supplemented by a second special subject, biotechnology.



Vocational school center for gastronomy –
also offering graduation with major subject of
biotechnology

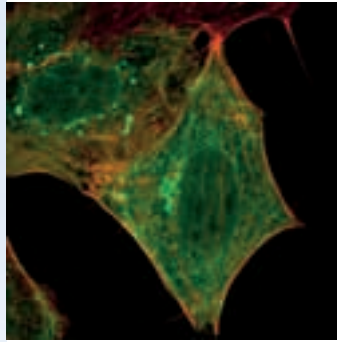
■ Educational facilities

and Universities

- Max-Planck Research School
- Studienakademie Dresden
- TU Dresden
- College for Technology and Business Dresden (FH)
- Weiterbildungsakademie GmbH Dresden
- RAG Bildung Radebeul
- Sächsische Bildungsgesellschaft für Umweltschutz und Chemieberufe Dresden mbH
- BSZ for agrarian sciences "Justus von Liebig"
- BSZ for gastronomy
- BSZ in Radebeul, Dippoldiswalde and Pirna

■ International top specialists

Graduates from 14 different countries are currently participating in the master degree course "Molecular Bioengineering". This interdisciplinary course of study offered by the Biotechnology Center of the TU Dresden, combines biology, engineering sciences, physics and information technology. The curriculum includes lectures and laboratory studies on the subject areas of biomedicine, genomics, molecular tissue engineering, proteomics and bioinformatics. In addition, students have the opportunity to look over the shoulders of international scientists, who regularly present their current research results. Teaching units on economic aspects of bioengineering,



"Molecular Bioengineering" at Biotec:
cell with fluorescence marked protein

the discussion of ethical and legal issues as well as the conveyance of basic knowledge for establishing and managing a biotech organization, guarantee that practical orientation is not neglected. This is further assured by the course location: the BioInnovationCenter, with its state-of-the-art laboratories, computer workstations and seminar facilities combines business and science under one roof.



MPI Molecular Cell Biology and Genetics:
biotechnology in Dresden is multi-cultural



JADO Technologies: a young biotech companies situated in the BioInnovationCenter

Successful growth

The potential of highly qualified specialists as well as effective collaboration of business and science on an international level have resulted in the settlement of many innovative biotechnology companies in Dresden. Some of them have been established as direct extensions of research projects. All are engaged in work on products and technologies, which in the future will have a formative influence on widely differing areas – from environmental protection to forensics – and will decisively change and improve medical diagnosis and treatment possibilities.



Dresden's Biotype AG is developing and producing multiplex PCR analysis systems for the genetic identification of humans ("genetic fingerprint")

Insight in the cell membrane

At JADO Technologies, completely new treatment possibilities have been discovered for disorders like asthma or Alzheimer's, for which there is currently no effective therapy. Scientists are working on the development of medications that selectively control the procedures in the cell membrane instead of attacking the entire cell with active substances.

Searching with GRIPS

Genome-wide RNAi Induced Phenotype Screening, in short: GRIPS is the technology developed by Cenix BioScience GmbH, that searches entire genomes for certain genetic functions and, in the process, supplies more information in a shorter period of time than conventional methods. The RNA interference method (RNAi) used for this purpose is regarded as one of the biggest breakthroughs in molecular biology. The second major area of activities in the organization is the development of RNAi-based therapeutic products against cancer and other diseases. Since 2003, Cenix has been cooperating with Ambion, Inc. in development and marketing of the first human genome-wide siRNA library.