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*Cryphonectria parasitica* tendrils on chestnut tree bark (Photo: Ministry of Agriculture and Regional Development Archive, Ministry of Agriculture and Regional Development, Bugwood.org)



# Career Forum

B3 Summer Science Camp  
at Olympic High School

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# Biotechnology career guide

- Biotechnology: the deliberate manipulation of DNA molecules to produce commercial products from/for living organisms.
  - Training in the related sciences is leading to an increasing variety of jobs, at many levels of expertise.
- Even in not practicing science actively, knowing about biology and biotechnology can give a competitive edge to
  - Business people in development, sales and marketing,
  - Lawyers who specialize in patent law or intellectual property,
  - Medical professionals who need to know genetic conditions and treatments for diseases,
  - Policy-makers who advise on what funding and regulations should look like,
  - Ethicists who help to set limits on what is done by citizens.

# General areas where biotechnology is used

- Basic research into biological and ecological mechanisms and processes
- Human Health
- Veterinary Sciences
- Plant Sciences
- Energy Sciences
- Environmental and Ecological Sciences
- Materials and Engineering Sciences
- Law Enforcement
- Production and manufacturing
- Regulatory officials
- Public Relations experts

# Basic Education prerequisites

- College-level Cell and Molecular Biology/Molecular Genetics – other sciences (organic chemistry, for example)
- Laboratory courses (may have various names) for practical experience
- Math courses (at least algebra and beginning statistics)
- There are positions that only require an AA degree – testing pedigrees for groups like the AKC, for example.
- Many positions require a 4-year degree – specialization often requires an additional year for a certificate (where human health is concerned, for example).
- A Masters degree allows a very large range of choices, in many fields you can be the head of a group
- A PhD allows you do the most – this might be in combination

# Biotechnology Laboratory Technician

- Average salary: \$40,250
- Education: In many cases a focused AA degree is sufficient, there are many opportunities with a BSc.
- Job Responsibilities: Assist other scientists, keep experiments moving by anticipating what will be needed in the future. Laboratory technicians may monitor and set up instruments, check on and record test results and other basic tasks. In manufacturing settings, they often are in charge of monitoring parts of the process for quality and accuracy.
- Growth is projected to be 12% per year through 2016.
- Schools in the region: Gastonia CC, any of the state Universities (some may be more specialized than others), Wake Forest University, etc.

# Bioinformatician

- Average salary: \$130,000 (top level)
- Education – you must have an advanced knowledge of both biology and computer science. An undergraduate major in Biology or Computer Science is matched with a minor in the one you did not major in. A Certificate will often be sufficient to work in a biomedical group as a technician, a Masters will allow you some autonomy to determine how work is done.
- Job Responsibilities: You use information technology and computer applications to take biomedical data and extract useful information. A MS is currently able to open many doors, a PhD allows you even more choices. Expect to take a lot of computer science and math along with your biological sciences.
- Growth: there is currently much greater demand than available personnel, our PSM students have found positions they were eager to accept within 6-8 weeks.
- Schools in the area: only UNC Charlotte has an undergraduate minor, Masters and PhD degrees specifically in Bioinformatics, but UNC and NC State have programs, as do many state Universities in the region.

# Clinical Research Associate

- Average Salary: \$79,000
- Core Job Responsibilities:
  - Extensive laboratory and research capability including **Lab Safety** and Inventory Experience working with various techniques such as PCR, Gel Electrophoresis, pipetting, microscopy, preparation of mini-preps, cell culture, UV, centrifuge, Plasmid transformation, Gel Extraction, Promoters Cloning and Sequencing, and Nanodrop. Excellent data analysis and reporting skills Expertise in Multi platform instrumentation and Lab quality control Handling of the SOPs and Work-Orders Experience at BSL2 and with molecular and microbiological organisms.

# Biomedical Engineer

- Average Salary: \$79,610
- Education: Combine biology and engineering training to develop tools that improve the lives of patients. A 4-year degree will be required, with a lot of emphasis on math and engineering principles and labs. A Masters degree or certificate in a specific area of expertise will make you very competitive.
- Work practices: usually work in teams to develop products like prostheses, artificial bone and skin or organs, imaging systems, robotics and devices to help regulate internal systems like heart beat or insulin release.
- Projected employment: growth of 21% through 2016.



# Crime Lab Technician

- Average Salary: \$44,000
- Education – focus primarily on biotechnology, but use extra credit hours to take forensic science courses and criminal justice. A 4-year degree is usually required, and for some types of positions there is an additional certification year.
- Work practices – this combines criminal justice and science. Your knowledge of science helps law enforcement make decisions about cases, through specialized testing and interpretation.
- Career outlook: higher than average in technical fields, especially for DNA testing.
- Education: there is a program at Western Carolina in Cullowhee and another at the University of West Virginia.

# Validation Technician

- Average Salary: \$36,000
- Education: an AA with a strong biotechnology background can be sufficient, a Biology degree is a very good qualification.
- Job Responsibilities – these positions are usually in the manufacturing area of biotechnology, testing for purity, contamination, packaging and labeling. Makes sure that regulatory and safety rules are met as products go out the door. They often perform trouble-shooting and suggest process improvements. This is an entry –level position.
- Prospects for growth: not given in the chart I found.

# Biotechnology/Pharmaceutical Sales

- Salary: \$74,000
- Education: A bachelors degree in Biology, Biotechnology or a related field, with addition course in business/marketing are recommended.
- Job Duties – identify customers who can use the product, understand the competition and talk about it knowledgeably, use technical language appropriately, relate well to people.
- Career Outlook: technical sales employment is likely to grow at 10% per year (this is about average) but biotechnology is likely to dominate this area so the numbers are probably higher.
- Schools in the area: any of the state Universities and many of the small colleges with strong science and business schools.

# Genetic Counselor

- Salary: \$68,000
- Education – an undergraduate degree in genetics with a minor in psychology, and a professional certificate. A Masters degree in genetic counseling. These individuals are licensed, similar to MDs, nurses and dentists.
- Job Responsibilities – health professionals (nurses, public health, social work) with specialized graduate degrees in medical genetics and counseling. helping people understand and adapt to the medical, psychological and familial implications of genetic contributions to disease. This process integrates:
  - Interpretation of family and medical histories to assess the chance of disease occurrence or recurrence.
  - Education about inheritance, testing, management, prevention, resources and research.
  - Counseling to promote informed choices and adaptation to the risk or condition.
- Job Growth Prospects – enormous, with the coming surge in personalized medicine.
- Schools in the area: Wake Forest University, UNC Greensboro, USC