

List of Careers:

1. Astrobiologist
2. BiomedicalPhotography
3. Biostatistician
4. Conservation Biologist
5. CuratorofBotany
6. Environmental lawyer
7. EnvironmentalBiologist
8. Epidemiologist
9. Food Scientist
10. Forensic Toxicologist
11. Genetic Counseling I
12. Genetic Counseling II
13. HighSchoolTeacher
14. Immunologist
15. Marine Biologist
16. OSHASpecialist
17. Oceanographer
18. Research geneticist
19. ResearchAssociate
20. ScienceWriter
21. Toxicologist

Haley Irving-Ruffing
Giman
Bio 44

Extra Credit Assignment: Career in Astrobiology

Astrobiology is a newly emerging field with multiple opportunities to study the origins, evolution, distribution and future life elsewhere in the cosmos (NASA). The program that harbors the 14 teams at various universities and institutions associated with astrobiology in NASA is the NASA Astrobiology Institute (NAI), that focuses on training graduate students and continuing research to find other habitable environments in our solar system, to search for prebiotic chemistry within our solar system and study the diversity of life on Earth.

An example of a typical job withing the NAI community would be what NASA calls a postdoctoral research fellow for one of the three research facilities; in this case I am choosing the Carnegie Institution of Washington. The goals of this research position are spelled out in NAI's astrobiological goals, which are as stated above. This career would include being a part of one of fourteen competitive teams that do specific research within the realm of the goals.

An example of a research opportunity that a postdoc fellow on the Carnegie Institution team is an expedition to study extremists, microbial life that lives in extreme environments on Earth, to possibly paint a picture where a bacteria-like life forms may be able to live. To complete a task like this, the fellow must structure experiments in order to successfully test and see the extent to which an extremist can live in extreme conditions. Then, with research money from a grant, for example, the necessary tools would be retrieved and a laboratory out at the site of experimentation could be set up and specimens collected. If the site was studying the bacteria and other life that surround the deep sea vents, some materials would include the following:

- Submarine (1 to 4 man sub)
- Main ship (to launch sub, hold all equipment)
- Sonar and map of deep sea area (if going to previously explored area)
- Research equipment (computers, video cameras, etc.)
- Containers for collection (to try and keep specimens alive need to have relatively high pressure, water, temperature like deep sea

Though this portion of the trip could take up to a year to complete a full array of tests and collections, back in the lab at the Carnegie Institution of Washington, there would need to be years and years dedicated to processing the collected information to either qualify or disprove the original hypothesis.

This job requires applicants to have either a masters or PhD in a science of this area (biology, biochemistry, microbiology) but be well vursed in astronomy and astrophysics (perhaps with a BS in one of those areas). Potential researchers are recommended to have been involved with NAI during graduate studies, preferably attending one of the universities where NAI has research teams, so that they can get experience working along side postdoc fellows.

Sites that were helpful for me to conduct this research and fulfill my interest in pursuing a career in this area were NASA's site for Astrobiology

(<http://astrobiology.nasa.gov/>) and each team's individual sites, which can put you in contact with postdoc fellows and the current research projects they may be working on.

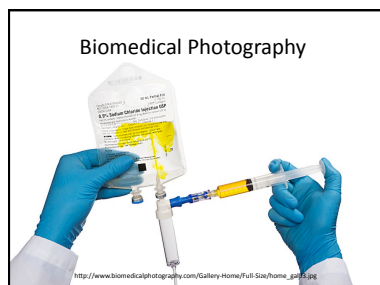
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Bio 44
03/11/2011

Career Exploration: Biomedical Photographers

1. Biomedical Photography or Medical Photography
2. "They use their skills and abilities to document scientific information that relates to biology, chemistry, medicine, and other health-related subjects."¹ Their photographs are commonly "used in textbooks, pamphlets, exhibits, instructional films, civil/criminal legal procedures, and teaching models. They may also document surgical procedures, record a patient's medical progress over a period of time, or photograph an autopsy. A major function of the medical photographer is to assist in education and research,".¹
3. Biomedical photographers can "work at hospitals, medical schools, universities, research institutes, pharmaceutical companies, advertizing agencies, or publishing houses,".¹
4. In this profession, it is useful to have knowledge in "art, biology, chemistry, algebra, photography, drawing and design, English, history, graphic arts, printing, health occupations/medical professions education, and computer illustration,".^{1, 3}
5. Biomedical photographers can be employed full-time, part-time, or work freelance. Their work hours are usually flexible.^{1, 2}
6. The annual salary of a beginning biomedical photographer starts off around \$30,000 but largely depends on location of their work and the salary will rapidly grow with increased experience.²
7. A biomedical photographer usually needs to have graduated with an associate or bachelor's degree and have had experience with photography.³ They also must pass written, practical, and oral examinations in order to become a Registered Biological Photographer (R.B.P).^{1, 2}
8. BioCommunications Association - <http://www.bca.org/>
Science Source - <http://www.sciencesource.com/main.html>
Health and Science Communication Association - <http://www.hesca.org/>
you can find some cool pictures at these websites:
<http://www.sciencesource.com/main.html>
<http://www.biomedicalphotography.com/index.htm>

Works Cited

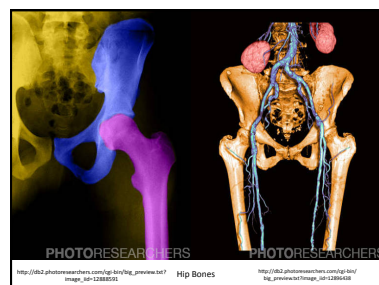
- ^{1.} <http://www.mshealthcareers.com/careers/medphotographer.htm>
- ^{2.} <http://www.careersandcolleges.com/tp2/cnc/articles/view.do?cat=cnc.c.careers-in-health-medicine&article=a-glimpse-at-the-profession-biomedical-photography>
- ^{3.} http://www.rit.edu/programs/program_detail.php?id=513



Job Activities

- Document information that concerns to biology, chemistry, medicine, and other health-related subjects (i.e. surgical procedures, recording patient's medical progress over a period of time, autopsies).¹
- Aids in education and research.
 - Used in textbooks, exhibits, instructional films, legal procedures, and teaching models.²

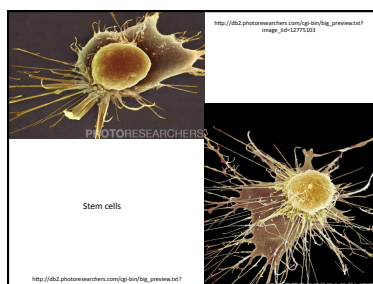
http://www.physicaphotos.com/large_photos/00f_photograph_028



Work life

- Can work at hospitals, medical schools, research institutes, pharmaceutical companies, advertising agencies, or publishing houses.¹
- Can be employed full-time, part-time, or work freelance.¹
- Annual salary of a beginning biomedical photographer is around \$30,000, but salary largely depends on location of work and will grow with increased experience.²

http://www.biomedicalphotography.com/Gallery/Medical/Full-Size/med_dev03.jpg



Useful skills

- Knowledge in art, biology, chemistry, algebra, photography, drawing and design, English, history, graphic arts, printing, health occupations/medical professions education, and computer illustration.³

http://www.photos.com/images/medical/medat_3.jpg

Educational Requirements

- Must have graduated with an associate or bachelor's degree and have had experience with photography.³
- Must pass written, practical, and oral examinations in order to become a Registered Biological Photographer (R.B.P.).²

http://www.biomedicalphotography.com/Gallery/Home/Full-Size/home_gal07.jpg

Useful Organizations

Check out their galleries!

BioCommunications Association
<http://www.bca.org/>

Science Source
<http://www.sciencesource.com/main.html>

Health and Science Communication Association
<http://www.hesca.org/>

http://www.biomedicalphotography.com/Gallery/Home/Full-Size/home_gal02.jpg

Works Cited

- <http://www.mshealthcareers.com/careers/medphotographer.htm>
- <http://www.careersandcolleges.com/sp2/cnc/articles/view.do?cat=cnc.c.careers-in-health-medicine&article=a.glimpse-at-the-profession-biomedical-photography>
- http://www.rit.edu/programs/program_detail.php?id=513

http://www.biomedicalphotography.com/Gallery/Medical/Full-Size/med_dev7.jpg

Biostatistician

Description

Biostatisticians work with pharmaceutical, biomedical, and healthcare fields to compile and analyze data from clinical trials. They usually work in the fields of medicine, public health, and biology, and focus on applied statistics.

A Day in the Life

This profession involves working closely with other health professionals, epidemiologists, health econometricians, computer programmers, and other individuals, often as a part of a team. Work environments include hospitals, healthcare facilities, colleges, and sectors of the government. More than half of a biostatistician's day is spent at a computer working with, interpreting, and generally understanding data. The rest of the day is often spent in meetings, planning sessions, or sharing ideas with other colleagues. Biostatisticians also have to help others understand their analysis, so they spend time giving presentations and explaining concepts to others.

Skills

- Strong analytical skills and a willingness to work with complex problems
- Mathematical, visual, and practical skills
- An ability to work under strict timelines
- Strong communication skills to help others understand your results
- The ability to remain unbiased when analyzing results

Work Hours

Hours typically involved a 40-hour workweek. However, it is not uncommon for biostatisticians to work more hours without pay.

Salary

With a master's degree, starting salary is between \$35,000 and \$65,000 a year

With a Ph.D, starting salary is between \$55,000 and \$85,000

Education

Usually a master's or doctoral degree is required with a Bachelor's in biostatistics or statistics. No other certification is required.

Contacts

Biostatisticians often work in the medical field with other companies. If you are interested in becoming a biostatistician, the following companies are good resources-

GenomicHealth (www.genomichealth.com)

Aerotek (www.aerotek.com)

Allergan (www.allergan.com)

Extra Credit Assignment: Career Exploration

1. Job Title: Conservation Biologist
2. Conservation biologists are constantly working to learn about the factors that affect diversity on the planet. They are constantly working towards solving environmental problems and preserving the natural world, by means of research, education, recovery programs for endangered species, making environmental policy, and management plans to name a few.
3. Depending on how a conservation biologist opts to conserve the natural world, his/her day could be spent out in the field doing research, teaching in a classroom, sitting in an office working to change environmental policy,
4. Conservation biology is a multidisciplinary area, so apart from a knowledge of biology, it is advantageous and advised to have a knowledge of a number of useful subjects, such as economics, law, sociology, anthropology, politics, education, and information technology to name a few.
5. Depending on the work you do, a conservation biologist would have varying lengths of work hours. If you do research, you might spend extended periods of time abroad and your work hours would be contingent on your research. However, if you worked in a laboratory or an office, the hours would be closer to 9-5.
6. Conservation biologists make around \$45-65 thousand a year on average. An entry-level salary would be closer to \$33 thousand a year.
7. A B.A. in Biology, Environmental Science, Conservation Biology, or some related field is required – attending graduate school and getting a PhD in Conservation Biology is advised.
8.
 - a. http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&from=fund A website in which you can search for undergraduate research opportunities.
 - b. <http://www.uwosh.edu/es/jobs/uwo-created-web-pages/biology> Outlines what a conservational biologist is and how to get started on a career.
 - c. http://kids.mongabay.com/lesson_plans/conservation_career.html A page full of advice from current conservational biologists.

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Bio 44 Lecture

S. Gilman

Extra Credit Assignment: Career Exploration

1. Career: Curator/ Curatorial Associate (Botanist)
2. This job entails the conservation of particular plant specimens (will depend) and the mapping of living specimens on the grounds (Arboretum) and labeling of each plant. Some other duties include maintaining maps of each collection and adding each year's new plantings to the old maps. The curatorial associate is also responsible for the coordination of volunteers and summer interns at the Arboretum.
3. The curator spends most of the time outdoors, regardless of the season. The different seasons correspond to when the curator needs to check on certain plants.
4. This job requires multiple things: expertise on the arboretum's plant specimens, patience when handling volunteers and managing personnel and computer work on the layout of the arboretum. No lab skills required.
5. This job is not freelance. The Arboretum would hire you and you would have the title of being the Curator and would work 9-5, if not extra hours.
6. There is a huge range when it comes to salaries because depending on the degrees you have obtained you may either have an entry level job or the highest paying job in the organization. Around\$ 31,000 to \$52,000.
7. A degree in Biology as well as a degree in Botany is required. Having a Ph.D. will also widen the range of positions that are open to you.
8. Possible resources: Botanical Society of America, American Society of Plant Biologists, and Society of American Foresters.

Environmental Lawyer

Job Description:

Environmental Lawyers enforce laws that govern how humans can interact with their environment. Often times laws that are violated involve ecology, marine biology, geology, and other studies of the environment. These lawyers prosecute individuals, companies, and other organizations that act in violation with laws that act to protect the environment from harmful emissions and pollutants, and encourage sustainable and responsible management of resources. They must have scientific knowledge so that they can thoroughly understand the components of violations and how they are impacting the environment on a closer level. Environmental lawyers also play a role in making legislation that prevents people from damaging the environment and the people around them. Some specialize in areas such as natural resources.

Job Location:

For the most part, environmental lawyers spend their days at a desk and in court because of what their career demands.

Useful skills:

- Good public speaking skills are required because as a lawyer you must be able to compose your thoughts and present evidence and a case to a judge and a jury in a convincing manner
- Strong writing skills are also required
- Organization is useful because cases usually involve a variety of evidence and details that are all important to the case as a whole and must be kept track of

Working hours:

- Environmental lawyers usually work a typical 9-5 job, but it depends on who they work for
- If a lawyer works for a private firm, their hours might be different than if they work for a governmental agency

Salary

- Typical entry-level salary is \$60,000-\$80,000

Educational Requirements

- A bachelor's degree in science, particularly biology or environmental science, can be very useful for an environmental lawyer
- Law school is also required, which is an additional three years
- In certain states environmental lawyers must also be certified

Professional Organizations:

- www.eli.org
- www.environmental.calbar.ca.gov

3/10/11

Career Exploration

Job Title: Environmental Biologist/Field Biologist (entry level)

Job Description:

Prepare aerial photographs and topo maps for field investigations.

Prepare field supplies for field investigations.

Perform general biological surveys at simple field sites or assist senior biologist with surveys at more complicated sites.

Perform jurisdictional delineation of wetlands and other waters at simple field sites or assist senior regulatory specialist with delineations at more complicated sites.

Monitor construction activities at construction sites to insure that work is being performed to specification of permit conditions relative to biological/environmental issues. Maintain communications with client personnel at the site and insure that the construction work is in compliance with all permit conditions.

Identify plants to genus/species and wetland indicator status in field.

Assist project manager or senior biologist in preparation of delineation maps, vegetation maps, and reports.

Perform literature research in office or at off-site locations as directed.

Time Spent:

Job duties vary depending on the project. One way time is spent is outside in the field monitoring construction to prevent the construction from exceeding the permits that have been issued. The biologist could also be monitoring the effects of the construction on the nearby wildlife and the biologist may have to delay construction should things like noise be harmful to sensitive species in the area. The biologist also must mark locations where there are nesting birds on or near the construction zone and may have to delay construction until the birds have fledged.

Another way to spend time is surveying flora and fauna. The biologist would conduct botanical and wildlife surveys to see what is occupying the site. Then they would produce a map of the plant communities. They also may have to do focused surveys to prove the presence or absence of endangered species. Sometimes the search for endangered species has specific protocols for each species that must be adhered to. All of the surveys may have to be done to comply with the California Environmental Quality Act.

10/10

Report writing is another important part of the time spent. The reports are either for the client, for the record, or for permitting agencies like California Department of Fish and Game.

Skills and requirements:

The biologist must have knowledge of animals and plants in the local region. The biologist must be able to identify both plant and animals down to the genus and species. They must have good knowledge habitats for each species. They must have knowledge of the protocols that are required for the species survey. For example the protocolsurveys for the Least Bell's Vireo must consist of eight separate site visits done at least ten days apart in order for the survey to be approved. The biologist must also be familiar with the regulations such as the Migratory Bird Treaty Act and the California Environmental Quality Act. The biologist must also have a permit from the federal government that allows them to handle certain endangered species in order to conduct surveys. They must also be able to write proper reports. They also have to be physically able to navigate harsh terrain. And they must have a valid driver's license to drive to the sites.

Work hours: Work hours are very loose. It depends on what kinds of surveys are being done. For instance bird surveys must be done in early mornings, frog surveys must be done at night, and plant surveys must be done at any time with daylight.

Entry level salary:

\$32-35,000 per year

Educational requirements: The biologist must at least have bachelor's degree in either biology, environmental biology, or environmental science. But it is recommended that most have or are working on a masters degree in environmental biology or environmental science. If they are going to be handling endangered species they must get permitted through U.S. Fish and Wildlife Service and some counties may want to have them certified for work within their specific county.

Professional organizations or websites:

California Native Plant Society: <http://www.cnps.org/>

Botanical Society of America: <http://www.botany.org/>

California Botanical Society: <http://www.calbotsoc.org/>

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Bio 44L Sec 3 Gilman

Epidemiologist

Job Description:

An epidemiologist studies the frequency and distribution of diseases within human populations and relates it to different characteristics of both the population and the environments. An Epidemiologist can perform research, work in education, government agencies, international organizations, and private corporations.

- Epidemiologist can work on refining methods of measuring and evaluating disease occurrences.
- Develop public health policy
- Study or research chronic diseases, infectious diseases, disease outbreaks, injuries, occupations, and environments

Job Environment:

Includes a variety of settings, including hospitals, health care centers, university laboratories, public health schools, and government research organizations. Work may be done in an office analyzing data, in a laboratory performing tests, or educating the public in academic and hospital settings.

Skills:

Individuals must have knowledge of epidemiology methods, human biology, laboratory methods, environmental analyses interpretation, parasitology, toxicology, immunology and pathology; of medical terminology; of statistical analysis, biometry, and demography; of epidemiological or statistical software; of social and economic conditions; and of current epidemiological developments and techniques.

Individuals must also be able to establish a healthy working relationship with others, meet and speak to the public, and must be able to write technical or nontechnical information material.

Individuals must also be able to participate in active learning, critical thinking, complex problem solving and must be able to use a personal computer and any other applicable software.

Work Hours:

Regular office hours, 9-5 job.

Entry-Level Salary:

Ranges from \$33,000- \$63,000

Educational Requirements:

Epidemiologists have a minimum of a master's degree in public health. Most have completed the postgraduate course and PhD program. Undergraduate requirements require strong backgrounds in biology, chemistry, and mathematics.

Useful Websites:

- www.apha.org
- www.apic.org

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Bio 44

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Food Scientist Fact Sheet

Food scientists play a vital role in the supply of food to our country. With a background in chemistry, physics, engineering, microbiology, and biotechnology, food scientists work to improve food products in the private and public sector as well as for the government.

There are a range of potential responsibilities for a food scientist. They look to improve techniques of processing, preserving, packaging, storing, and delivering food items. They may also have the task of discovering and researching new food sources. The nutritional information given by the government mandated nutrition facts labels on packaged foods is researched by food scientists. They analyze the content of vitamins, fat, sugar, and protein in such food products. Sometimes food products contain harmful or undesirable additives. It is a food scientists job to research and find substitutes for these additives. They also research possible improvements to traditional food processing techniques such as baking, blanching, canning, drying, evaporation, and pasteurization.

A food scientist may work for the government or for a private or public company. Since the main activities of a food scientist are research based, they spend much of their time in a lab. A food scientist may work for example in the test kitchen of a large food processing company. They may also work as an inspector for the government to ensure government regulations such as those regarding sanitation, safety, and quality are being adhered to. Food scientists may work directly with processing operations as well. A 40 hour work week can be expected although work hours depend highly on the specific position of the food scientist as

well as the employer.

Food scientists can expect to work either independently or as part of a team. Oral and written communication skills are very important. Also beneficial to them would be general business knowledge as well as the fundamentals of statistic techniques and computer skills.

As of May 2008, the average annual salary for a food scientist was \$59,520. There are specific food science degree programs that have a basis of food chemistry, food analysis, food microbiology, food engineering, and processing operations. A bachelors degree in food science is sufficient for entering the industry.

For more information regarding food sciences some helpful resources are www.bls.gov, www.ift.org, www.usda.gov, and www.foodsciencecentral.com.

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Biology 44L

Dr. Sarah Gilman

March 10, 2011

Career Exploration

Title: Forensic Toxicologist

Job Description: Toxicology is the study of drugs, poisons, and other toxins and their adverse effects on living organisms. Forensic toxicology is the application of toxicology to legal matters, such as criminal investigations, medical and legal death investigations, and workplace drug testing through the examination of human tissues and fluids for the presence or absence of toxic substances. Forensic toxicologists also write formal reports illustrating their findings which can be distributed to lawyers, pathologists, crime scene investigators and employers. Forensic toxicologists might also be asked to testify in court.

Education and Skill Requirements: Forensic toxicologists need a bachelor's degree in either pharmacology, chemistry, biology, biochemistry or a related scientific field from a college or university accredited by the American Academy of Forensic Science. Forensic toxicologists usually hold masters and PhDs in the same areas of study as mentioned above. However, forensic toxicology and toxicology graduate and post-graduate programs (masters and PhD) are available in many American universities and are more favored by employers. Throughout their careers, forensic toxicologists will need to enroll in continuing education programs and training programs to update their skills and keep up with advancements in the toxicology field.

Forensic Toxicologists need excellent writing and communication to effectively convey their findings. They must also have strong project management, math, statistics, and computer skills for the performance of toxicology tests. Forensic toxicologists have to be trustworthy and ethical because they are exposed to and handle sensitive, confidential information on a daily basis.

Typical Entry-level Salary: \$35 000 - \$60 000 annually.

Average Day/ Duties:

- perform routine tests and analyses of body fluids, tissue, or evidence to identify the presence of alcohol, drugs, and/or toxic agents
- write reports about toxicological analyses
- conduct laboratory audits

- consult with clients and specialists (coroner, law enforcement officers, attorneys, pathologists, criminalists) regarding the nature of evidence, laboratory analysis, and interpretation of results and provide expert testimony to these agencies
- supervise and appraise the work of subordinate staff members

Working Hours: 40-hours per week depending on the nature of the cases.

Resources:

- American Academy of Forensic Sciences : <http://www.aafs.org/>
- American Board of Forensic Toxicology : www.abft.org
- Young Forensic Scientists Forum : <http://www2.aafs.org/yfsf/index.htm>

1. Job title: Genetic Counselor

2. Job description:

- a. Genetic counselors may work as members of a health care team (directly seeing patients), in research/academia, public health, or administration. A typical genetic counselor works with families who may be at risk for birth defects and/or other inherited disorder. He/she investigates the specific genetic disorder involved, analyzes inheritance patterns and risks of recurrence, explains available options for testing and/or treatment to family members, and provides supportive counseling as families make decisions based on the information provided (e.g. decisions about whether or not to terminate a potentially risky pregnancy). Traditionally, genetic counselors have mainly worked with prenatal cases in which there is a risk of heritable disease, but the field has been expanding to encompass adult-onset genetic disorders, including cancer. Genetic counselors may also play a patient advocate role, referring patients to available support services or working in the formulation of public policy. Other counselors work in research and academia (for example, teaching students in health professional fields), and may or may not actually see patients. Finally, some genetic counselors find work in pharmaceutical research, developing genetics education programs for business groups, coordinating genetic services, developing online resources for physicians and public, or a variety of other related administrative fields.

3. Where a genetic counselor spends his/her days:

- a. The typical genetic counselor spends his/her days talking to patients, either in person or over the phone, and doing background research related to his/her cases; this may involve certain amounts of lab work, or meetings with lab technicians. Location varies based on the counselor's specific job – a genetic counselor involved purely in counseling may work at a smaller clinic, in a more office-based setting, while a genetic counselor also involved in teaching and/or research may work at a university hospital, with some time spent both in the clinic and in the lab or classroom/lecture hall.

4. Useful skills:

- a. Patience, empathy, and overall good interpersonal skills
 - i. Important to develop a solid, trusting counselor-client relationship
- b. Good communication skills (oral and listening)
- c. Ability to calmly talk clients through high-stress situations
- d. “Nondirectiveness” – ability to offer advice without deliberately steering clients towards a certain decision

- e. Mathematical skills – genetic counselors are often called upon to explain statistical analyses (mainly of genetic inheritance patterns) to their clients

5. Typical work hours:

- a. Most genetic counselors work a typical 9-5 schedule, 5 days a week (but this depends on the specific area – counseling, research, teaching, etc.) Overtime work is common in all subfields.

6. Typical entry-level salary:

- a. Approximately \$40,000 to \$50,000 a year

7. Educational requirements:

- a. Bachelor's degree in a field such as biology, genetics, nursing, psychology, or social work
- b. Accredited master's degree program in genetic counseling
 - i. Master of Science degree (MSc)
 - ii. Often include practical training in the genetics departments of hospitals
 - iii. Takes one and a half to two years to complete
 - iv. Programs may have different emphases (medical vs. psychological)
- c. Certification by the American Board of Genetic Counseling (ABGC)
 - i. Requirements:
 - 1. Graduation from an accredited master's program in genetic counseling
 - 2. Documented clinical experience
 - 3. Written exam
 - ii. Certification not required to practice & see patients, although uncertified genetic counselors may require supervision by certified counselors

8. Useful professional organizations or websites for someone considering a career as a genetic counselor:

- a. The National Society of Genetic Counselors (NSGC)
 - i. <http://www.nsgc.org/>
- b. American Board of Genetic Counseling
 - i. <http://www.abgc.net/ABGC/AmericanBoardofGeneticCounselors.asp>

Extra Credit: Career Exploration

Title: Genetic Counselor

Job Description: A genetic counselor is responsible for meeting with patients who are at risk for inherited disorders or diseases, as well as their families if applicable. They are there to provide information about the nature of the disorder/disease as well as the probability of developing it or transmitting it, and the treatment or management options. An example of a case that a genetic counselor might encounter would be analyzing the amniocentesis of a pregnant mother, and warn of genetic disorders present in the amniotic fluid, such as sickle cell disease or cystic fibrosis. If there are any present, the genetic counselor is then responsible for helping the mother make an informed decision about whether to keep the baby or not, if that is an option.

Workday: The workday of a genetic counselor alternates between lab work and patient counseling.

Skills: The ability to use lab equipment such as benchtop centrifuges, darkfield microscopes, and gel documentation systems, is critical for a genetic counselor. Other necessary skills include proficiency in the fields of biology, medicine, psychology, counseling, and math.

Hours: Genetic counselors generally have 40-hour workweeks.

Entry-Level Salary: The entry-level salary of a genetic counselor is approximately \$45,000.

Education Requirements: To become a genetic counselor, it is necessary to complete a master's degree in genetic counseling before taking the certification exam. The process requires having participated in 50 cases and taking two separate tests—one for general knowledge and one specifically for the knowledge required to be a genetic counselor.

Websites/Organizations:

American Board of Genetic Counseling - <http://www.abgc.net>

National Society of Genetic Counselors - <http://www.nsgc.org>

Joshua Choate

Introductory Biology

Dr. Gilman

March 11, 2011

Extra Credit Assignment: Career Exploration

High School? Marine Biology Teacher

The career that I chose to study was that of how to become a Marine Biology teacher. In order to find out more, I gained an interview with Mr. Benjamin Kay, who teaches Biology and Marine Biology at Santa Monica High School in Santa Monica, California. During the interview, he answered several questions pertaining to my interest in the career of Marine Biology teacher.

The job in question was the career of Marine Biology teacher. One question that was asked was concerned with the activities or goals of a Marine Biology teacher. Mr. Kay responded that one of the main goals for a scientific educator is to transfer information to students in an effective manner and to bolster critical thinking. Another goal of a marine biology teacher was to teach prospective students about ocean mechanics, how organisms interact together and how they interact with their physical habitat.

In terms of how a marine biology teacher spends his or her day, Mr. Kay commented that there are two major areas in teaching marine biology: the classroom and the field. While one spends most of the time in the classroom teaching, spending time outside the classroom is just as important. Utilizing fields such as beaches, piers and intertidal zones allows students to receive a hands-on experience with their class material. According to Mr. Kay, using the field as a way to integrate class material is important for influencing students' learning of Marine Biology.


Another question asked which skills were useful to a marine biology teacher. According to Mr. Kay, skills such as flexibility in subject matter are important especially in keeping up with current studies and changes in scientific knowledge in that teachers' field of study. Also, interpersonal as well as communication skills are required for conversing with different age groups, primarily students. Also, pedagogical strategies are important for a marine biology teacher in transmitting information to students.

When asked about the typical work hours involved in being a marine biology teacher, Mr Kay responded that an outgoing teacher sacrifices a lot of commitment and treats teaching as a full time job. Although a teacher is paid for coming to the school, a good teacher, Mr. Kay explained, spends typically sixty hours a week dedicated to teaching and engaging students in their studies. In terms of salary, Mr. Kay commented that a teachers' salary depends on graduate units that a prospective teacher accumulated while in school. A typical starting salary could be forty to forty five thousand dollars. However, the more units a teacher accumulates, the higher the salary he or she can obtain.

When asked about the educational requirements involved in becoming a marine biology teacher, Mr. Kay said that in addition to having a bachelor or graduate degree in biology, one would have to pass the CSET exam which is a test that examines a person's competency in their chosen subject of profession. Also, the CBEST exam also known as the California Basic Educational Skills Test, is an exam which examines a prospective teacher's understanding of basic fundamentals. In terms of possible resources that a person interested in this career might find useful according to Mr. Kay included contacting the California Board of Education state website. Also, he recommended visiting the sites of universities to see what they have to offer. Even talking to an education counselor could provide someone interested in this career with information on how to gain internships or opportunities or gain hands on experience in the subject of scientific education.

website?

Career Exploration

1. Immunologist
 2. Immunology is the study of the immune system, or the system that is responsible for protecting organisms from disease. An immunologist is a research scientist who studies, analyzes, prevents, or treats diseases that involve the immune system. They are especially interested in diseases like allergies, sinus infections, and immunodeficiency diseases.
 3. An immunologist typically works in a hospital, clinic, private office, or in a lab doing research.
 4. Immunologists have to be very observant of their patients and must be able to apply science to helping treat their diseases. Those in the field of research with a medical school, government, or industry have to be especially well organized, comfortable in lab, and analytical to form conclusions from their results. These research experiments often require presentations so immunologists must be good writers and presenters. When working in clinics and hospitals, immunologists have to be capable of retrieving patient history, communicating with patients, and studying test results to make correct diagnoses.
 5. Their job is typically full time and hours are usually 9:00-5:00. Some who work in hospitals are on call at other hours.
 6. A salary for an immunologist can be anywhere from \$50,000-\$200,000 per year depending on what branch they are in and what part of the country they work in. Typically in a lab or hospital immunologists make more than \$100,000 per year.
 7. The field of immunology requires a Ph.D. or M.D. For research a Ph.D. is required whereas a M.D is required for physicians. In addition to the degree, physicians need 3 years of residence training and must pass a test through the American Board of Allergy and Immunology. They require education in biology, chemistry and math. In addition it is important to have knowledge of computers and technology associated with research.
 8. Students interested becoming an immunologist should check out the website for the American Board of Allergy and Immunology and the Journal of immunology.
<https://www.abai.org/index.asp>
<http://www.jimmunol.org/>
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Marine Biologist

- The job of a marine biologist is to research the ocean and all of the interactions that occur amongst the diverse life forms found within the ocean.
- The profession of marine biologists includes working to help preserve the ocean environment and all of the creatures and plants living there.
- Marine biologists can work in the field while conducting research, in offices organizing projects, or in laboratories investigating data and performing research.
- There are many skills that are necessary for marine biologists to have.
- Marine biologists need to have experience in researching and conducting laboratory experiments while working with various life forms.
- They also need to know how ocean life interacts and develops in order to be able to collect data and form scientific observations.
- Additionally, it is important for marine biologists to have proper training with undersea diving.
- Marine biologists also need to have good communication skills in order to work with fellow researchers and members of their research teams.
- Marine biologists need to be organized and have long attention spans in order to focus on performing dissections, making calculations, or carrying out experiments.
- Marine biologists most commonly work forty-hour weeks, but some work more hours.
- Although, marine biology can be a 9-5 job, some biologists may have to work strange hours depending on the research they are performing or the location they are working at.
- Marine biology can be a freelance position.
- Marine biologists can also work for government organizations, universities, aquariums, or environmental agencies.
- The typical entry-level salary for a marine biologist is thirty-six thousand dollars per year.
- The average salary of a marine biologist ranges from thirty-six thousand dollars per year to sixty-four thousand dollars per year.
- For an entry-level job in marine biology, a Bachelor's degree is the only educational requirement, but it can be difficult to find a job without obtaining a higher level of education
- Marine biologists who perform even the most basic of research have PhDs.
- The job market for marine biology is extremely competitive so a PhD is definitely a necessity if one wants to conduct research.
- There is no license, exam or certification necessary to become a marine biologist. Although, every marine biologist does need to be certified to dive.
- Some useful websites for students interested in marine biology include:
 - <http://marinebio.org/>
 - <http://www.mcabi.org>

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Biology 44
Professor Gilman
February 25, 2011

Career Exploration Assignment: Oceanographer

1. Describe the job. What are the main activities/goals of a person in this job?

The field of oceanography has a variety of different subspecialties that one could study. Three of the most interesting to me are physical, chemical, and geological oceanography. Physical oceanographers research the movement of the oceans and the forces that cause motion within it. Chemical oceanographers are interested in the formation of sediments on the ocean floor, relationships between different chemical compounds that exist in the ocean, and the effects of pollutants and other chemical inputs on the marine habitat. Geological oceanographers primarily study the formations, composition, and history of the seafloor. Through their studies, they help piece together information about how the earth formed and how the movement of plates and continents results in dramatic seismic and natural events around the world.

2. How does someone with this job spend his/her day? In front of a computer? At a lab bench? Outdoors? Elsewhere?

Typically, an oceanographer, regardless of their concentration, will spend a portion of their time in a lab, the rest out in the field (in the water). Often, an individual scientist or a group of scientists together may be simultaneously running several different experiments and studies, which could require that they divide their time between indoor and outdoor work.

3. What skills are useful to someone in this job? Math? Writing? Public Speaking? Planning/Organization? Others? Are there specific laboratory skills required?

A good oceanographer should be proficient in math and many different sciences, as well as a strong writer. She should be able to understand all the natural occurrences behind the specific topic she is researching, and use it to form hypotheses and possible ideas about what is going on in the ocean environment. As with many other fields of science, oceanographers want to eventually have their findings published in a journal or book. As such, it is important that she be able to clearly synthesize her findings and ideas into a well written scientific paper.

4. What are the typical work hours? Is this a 9-5 job? Freelance?

Oceanographers will likely work for a lab or environmental organization of some kind, which would provide the stability of a regular, 9 to 5 job. However, with experiments running, hours may be odd depending on the nature of the experiment, and the data collection requirements.

5. What is a typical entry-level salary for someone in this position?

Depending on the nature of the job, entry level salaries can range from \$30,000 to \$60,000 a year, with a chance to earn up to \$300,000 a year later on in ones career.

6. **What are the educational requirements? Do most people in this career have a graduate degree? Is there a certification or exam required?**

Oceanographers are a very highly educated group of people. For the best chance of success, an undergraduate degree, masters degree, and a Ph.D. are recommended.

7. **What professional organizations or websites would be useful resources for students interested in this career?**

<http://www.marinecareers.net/index.php>

<http://scripps.ucsd.edu>

<http://marinebio.org/marinebio/careers/>

Occupational Health and Safety Specialists

Description: Occupational health and safety specialists analyze work environments and create programs that prevent disease or injury. Their main goal is to keep workers, property, the environment, and the public safe from biological, chemical, or physical sources, but their activities vary greatly depending on the industry, workplace, or hazards they are concerned with or the specific qualifications and skills they have. For example, they may design safe workspaces by evaluating potential hazards, test air quality, protect historical data, enforce safety, health, or environmental rules, or design machines that increase worker comfort and efficiency based on proper body alignment to save the company money and lower insurance costs.

Work Environment: Occupational health and safety specialists work in many different places including offices, factories, and mines. 41% of occupational health and safety specialists work for government agencies. Their jobs may also include fieldwork and travel depending on what specific sector they are involved with. They may face strenuous, dangerous, or stressful work conditions.

Qualifications and educational: A bachelor's degree in occupational health, safety, engineering, biology, or chemistry is related for most positions although a master's degree in industrial hygiene or health physics may be required. All employees must be trained in the respective laws or inspection of their work area. Credentialing is strongly encouraged and varies greatly in choices and requirements. People should be able to communicate effectively, think critically, solve complex problems, and enjoy detail-oriented work.

Work-Hours: This job is normally a 40-hour week job, although over-time and irregular hours are also a possibility.

Salary: Entry-level salaries begin at \$35,250 per year. The median salary is \$62,250 per year with the lowest 10 percent earning less than \$35,870 and the highest 10 percent earning \$93,620.

Sources:

<http://www.bcsp.org>

<http://www.aiha.org>

<http://www.cdc.gov/niosh/>

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Bio 44

11 March 2011

Title of job: Research Geneticist

Description: Genetics research can be lab-based or can involve research in a variety of exotic locations around the world. The main goals of a geneticist can vary, ranging anywhere from cancer research to mapping the human genome to discovering the evolutionary relationships between organisms. Research geneticists may even branch into genetic engineering and biotechnology, a rapidly expanding new field involving genetically modifying already existing organisms to create anything from enriched foods to new medicine. Research in genetics is mainly lab-based, although sample collection can bring the biologist to a variety of locations.

Skills: A person interested in a career as a geneticist must also be skilled with using technical equipment, such as computers. Often, geneticists must work with complex pieces of equipment, such as PCR (polymerase chain-reaction) sequencer. A specialized set of laboratory skills must also be acquired. Some analytic and statistical skills are useful, and the interested person must also be able to work well in a group, since most research will be done in teams.

Hours: Since it is lab based, research biology is a 9-to-5 job, but as with any career in science it can be demanding beyond the typical work hours.

Salary: Entry-level salary for someone in this job ranges from \$50,000-\$80,000, depending on the type of research and the degree of specialization. For example, the leading research geneticist in a medical study will be earning a higher pay-grade than a genetics-specialized lab technician.

Educational requirements: Although a bachelor's degree will suffice for some research assistant positions, those who wish to pursue higher career goals should get their masters or PhD, and those interested in medical molecular biology and genetics might consider getting their MD.

The Max Planck Research Institute: <http://www.mpg.de/en>

Fred Hutchinson Cancer Research Center: <http://www.fhcrc.org/>

Human Genome Sciences Institute: <http://www.hgsi.com/>

American Society of Human Genetics: <http://www.ashg.org/>

Mary Creedon
Bio 44
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3/11/11

Career Fact Sheet

Research Associate (in a Biotech company)

- Research associates conduct experiments in the lab in order to develop new drugs, and analyze the data they collect to help them develop these drugs.
- Research associates spend their days in the lab running experiments and collecting data. When they are not running experiments they are analyzing the data they have collected and presenting it in graphs to show to other team members. Research associates are also responsible for keeping track of the inventory needed to perform their experiments.
- Having laboratory experience is necessary to perform this job. Understanding how to present data is also necessary. Someone with good attention to detail who is a meticulous lab scientist is important.
- For the most part the hours are about 9-5. Working on the weekends is not usually needed for people of this position (they work under a PhD so that person would usually be in charge).
- Entry-level salary is usually roughly \$40,000.
- A BS or an MS is usually required to hold a job of this position. In the future many people move up after going to grad school, but initially a BS would be enough to have this job.
- onetonline.org is a good website for studying this career.

Victoria Davis

3/3/2011

Biology 44

Professor Gilman

Career Exploration Fact Sheet

1. The title of this job is Science Writer. Alternate titles for this career include Science Reporter, Science Journalist, Medical Writer, Technical Writer, or Information Officer.
2. This career entails a person to write objective and accurate news reports, feature articles, books, documentation, manuals, public relations, or other written materials for general public and professional audiences.
3. Someone with this job typically spends his or her day researching information for local, state, national, or global news reports, producing in-depth reportage of happenings in the science and technology world. Science writers may work for universities, medical centers, pharmaceutical companies, biotechnology firms, high-technology corporations, government agencies, laboratories, research institutes, science museums, or nonprofit health organizations.
4. Skills that are useful to someone in this job are writing, organization, research, communication, computer, self-management, business skills. It is also beneficial to have personality traits such as the ability to be interpersonal, creative, observant, flexible, disciplined, self-motivated, and persistent.

5. Typical work hours vary depending on the job. Most science writers work independently and rely on self-management skills to reach deadlines for proposals, research, or other related assignments.
6. Typical entry level salary varies depending on education, experience, specialty, employer, and geographic location. Annual entry level salaries range from \$20,000 to \$40,000.
7. Educational requirements include a bachelor's degree in a science discipline, journalism, English, or a related field. Most Science Writers have a master's or doctoral degree in a science or engineering discipline.
8. Professional organizations or websites that are useful resources for students include the National Association of Science Writers (<http://nasw.org>), Association of Health Care Journalists, and Society for Technical Communication.

Biology Major Career Fact Sheet

Jana London

- 1) Toxicologist
- 2) Toxicologists study the effect of potentially dangerous chemicals to people, animals, and the environment. Toxicologists use their extensive background in biology and chemistry to create ways to protect, control, and reduce the exposure of toxic substances in the environment. Toxicologist will inspect environments (i.e. power plants, chemical manufactures, etc.) and surroundings to test if there are any hazardous exposures.
- 3) Toxicologists can spend their time in various places. Many work in labs observing and regulating the dangers of toxic substances. Others may assist in inspections of contaminated areas. Not only do toxicologists observe what is toxic but also why something is toxic. They look at a number of structures of molecules and the structure of the systems that toxic substances attack and explain reasons why something may be toxic to one thing but not to another. Evaluating potency levels is also something toxicologists work with. Commonly, toxicologist will be hired by the government to develop and enforce laws to ensure that chemicals are produced, used and disposed of safely.
- 4) There are many skills required for being a toxicologist. Training in toxicology includes studies in pharmacology, biochemistry, analytical chemistry, and environmental studies in addition to toxicology. Planning and organizational studies are important as well since toxicologists are continuously collaborating with other toxicologists. Comprehension of the mathematical topics (including calculus) involved in the above studies is also a necessity. Excellent computer and lab skills are also crucial. In addition, and maybe most importantly to the general population, toxicologist need to be able to articulate appropriate and alternative actions when handling potentially toxic substances.
- 5) A toxicologist typically works either independently or with a team, therefore typical hours depend on the working environment the toxicologist is working in. Travel sometimes is necessary to collect data, provide testimony or affidavits, attend meetings or assist in crisis intervention. Extended work hours may be necessary in special circumstances.
- 6) A typical salary for a toxicologist estimates around \$62,000-\$130,000 a year. Most entry-level toxicologist will receive a salary on the lower side of the range.
- 7) Educational requirements include a least a Masters degree in chemistry, biochemistry, a biological science, or forensic science. Most toxicologists have a Doctoral degrees.
- 8) -http://www.netsci.org/Resources/Web/society_toxicology.html
http://www.niehs.nih.gov/research/resources/library/research/organizations/pro_associations.cfm
http://www.toxicologyconsultant.com/toxicology_websites.html

