Scientist

If you like asking questions, figuring out the way things work, or designing experiments that test your theories, this may be your dream career. Scientists study, observe, identify, describe, perform experiments, and attempt to explain everything under the stars – and the stars too!

Scientists build on the work of other scientists to theorize and produce new results, information and technology for current and future generations. Their discoveries and inventions make our lives more comfortable, convenient and healthy. They ask questions whose answers can be sought through experience and established by proof. They draw firm distinctions between theory and fact. Curiosity, determination and patience are the foundations of a scientist's character.

Top Ten

Curious Capers

There are as many types of scientists as there are objects of curiosity, but "scientist" generally means someone who studies the physical world of objects and activity by the laws of chemistry, biology and physics. It covers a wide range of specialties; within each general specialty there are even more specific specialties, so the list of types of scientists can seem endless. Here are ten kinds of scientists, the jobs they perform and what their work means to all of us.

ASTRONOMER:

Astronomers study outer space and the planets: what they're made of, how they change, move around, form galaxies, and more. They attempt to explain how the planets came to be, how they interact with gasses and one another, how they change and evolve, and what it all means for our own planet's past, present and future. Unlike most scientists, astronomers rarely interact directly with their objects of study by touching, measuring and experimenting on them. Astronomers rarely get to be astronauts because manned space missions cost a lot and are very risky.

Most astronomers work at computers figuring out complex math problems and observing the heavens through telescopic imaging on computer screens.

BOTANIST:

Botanists study plants: their structure, functions, how they're related, where they grow, how they multiply – everything about them! They gather information about how plants support human life by providing the oxygen we breathe, the foods we eat, and ingredients for medicines that help us heal and prevent disease. Studying plants and experimenting with their growth under varying conditions can offer clues about human life and the earth's changing atmosphere, giving us opportunities to adapt and respond to variations in our air, food and water supplies.

CYTOLOGIST:

Cytologists study the makeup and life of cells: their structure, what makes them healthy or diseased, how they respond to varying influences, and what occurs during a typical cell's life. Cytologists often work closely with medical offices and hospitals testing and observing tissue samples (biopsies) taken from patients. Their work helps pathologists study the progress and causes of disease by observing cells and recording their behavior under normal and abnormal conditions.

ECOLOGIST:

Ecologists focus their study on how living things interact with their environment and with each other. They tend to choose specific organisms and environments to study, becoming experts with sensitivity to subtle changes taking place in small areas of animal, plant or insect behavior. Recording and studying these changes help ecologists predict trends, such as the effects of humans on other habitats and life forms. Government officials study ecological reports to determine and regulate the effects of human living on the environment and the species that inhabit it.

EPIDEMIOLOGIST:

Epidemiologists study the history of epidemics or diseases of mass destruction on world populations. Unlike many medical scientists, epidemiologists study large groups of people over long periods of time rather than single individuals. They strive to determine causes of illnesses, common health weaknesses, and trends of disease (like mutations and immunities) in

order to prevent and combat the destruction of large numbers of people stemming from a common cause.

GEOLOGIST:

Geologists study our planet Earth: its structure, activity, composition, history, and relationship to its atmosphere. They find clues to the Earth's past in its present composition and activity and form theories about its future. They study the paths of the shifting continents, the frequency and impact of volcanic eruptions, the cause and effects of melting polar ice caps, and other large-scale changes that have and continue to occur on our planet. This information allows us to develop protections against natural disasters and environmental changes that threaten humankind.

MARINE BIOLOGIST:

Marine biologists study the plants and animals that inhabit our oceans. Since 71% of the Earth's surface is covered by salt water, changes to oceanic populations impact the rest of our environment – food, soil, water supply – everything that we depend on in our lives. Imbalances in the ocean can threaten our own survival as oceanic creatures and plants represent a huge portion of the food chain and contribute millions of tons of oxygen to the atmosphere every year. Marine biologists uncover secrets of survival and remind us that our own health relates directly to that of our environment.

PALEONTOLOGIST:

Paleontologists study fossils, or the traces of past life. Fossils tell us about the species, cultures, disasters, weather changes, plant life, and evolutionary patterns of all that has lived and died before us. Wood, bones, stones, seeds, tools, clothes, roads – any evidence uncovered from hundreds to billions of years ago can help humans learn about those threats to life that have come before us, so that we may avoid them in the future. Understanding fossil formation has also removed much of the guesswork involved in drilling and mining, educating us about where and how our natural resources, like oil and marble, are most likely to be found.

SEISMOLOGIST:

Seismologists study earthquakes, or the periodic and sometimes violent shudders that result from the shifting of continental plates along "fault lines" in the Earth's crust. These scientists assess the pressure building along "faults"

and attempt to predict where and when earthquakes are likely to strike and the degree of destruction they may leave in their wake. They also forecast the aftershocks that occur following an initial quake. Seismologists theorize about the relationships between natural changes occurring in soil and rock and quake activity, and they wait to test their theories until the Earth is actually moved to quake.

ZOOLOGIST:
Zoologists study the myriad animals of the world. They usually choose a specific species on which to focus, and spend a significant portion of their professional lives collecting, photographing, diagramming, measuring, and scrutinizing their subjects. Their work is fueled by the idea that every evolving species has developed secrets about survival that, if discovered, can be adapted for human use and protection. The information zoologists gather contributes to our understanding of conservation, environmental change, and medicinal development. It also helps us to better comprehend our own species' origins, evolution, vulnerabilities and strengths.

How to Get There

Getting Down To A Science

- Feed the need! Ask, explore, interact, touch, measure … don't hold back! Scientists want to know everything about the subjects that interest them, so follow your own curiosity. Ask your teacher for experiments you can do at school or home. Of course, good scientists don't endanger themselves or their subjects in the process, so use good judgment and consult an adult when you indulge your curiosity through experiments.
- Be prepared. A career in science means lots of math, chemistry, biology, and physics. Neglecting these subjects early on will only mean twice the work later. Some of the material is challenging even for the best students, so don't get discouraged. Remember, determination and patience are the keys to becoming a successful scientist.
- Take notes. Keep a science journal. Scientists track so many details they can't possibly make use of it all without recording and storing it. Writing down your thoughts and questions can help you to focus your

work on pursuing specific answers and patterns. You never know what connections you'll make between the bits of data you gather, or what points may link up with the work of your peers.

- Innovate and invent! Developing new ways of doing everyday things is a great way to start on the path of scientific discovery. Scientists pull knowledge from every corner of their experience and bring lessons to bear on new situations and challenges. This is a skill acquired and perfected over a lifetime, so get started now!
- Know the news. Much of the news involves scientific discovery and speculation from the tracking of hurricanes and weather forecasts, to breakthrough surgeries and even fossil discoveries. News in one area can affect other fields of study, so keeping up on the latest information is essential to staying on the cutting edge of science.
- Read everything you can get your hands on. The more you know, the better equipped you are to discover what hasn't been considered or even dreamed of.
- Use your library and the Internet to explore your world. Search under keywords: BIOLOGY FOR KIDS, CHEMISTRY FOR KIDS, PHYSICS FOR KIDS, SCIENCE FOR KIDS, SCIENCE CAMPS FOR KIDS, EXPERIMENTS FOR KIDS, SCIENTISTS, DISCOVERIES, and INVENTIONS.

Activity

Get Charged!

Our world and everything in it is made up of tiny electrically charged particles called protons and electrons. Protons have positive charges, while electrons have negative charges. Normally protons and electrons distribute evenly, but sometimes electrons on one surface bounce onto another when they are rubbed together. This generates static electricity! Two surfaces with the same charge (all positive or all negative) move away from each other and those with opposite charges attract.

You'll need:

- A friend
- Two balloons
- Two pieces of arm-length string
- A wool sock
- Paper and pencil

Blow up the balloons and tie them closed. Then fasten a piece of string to each balloon. Now you'll record the results of your "control group." The control group acts as the base of the experiment. You'll compare the results from the control group to new results when you change a condition or influence later in the experiment.

Control Group 1:

Each of you holds a balloon close to your hair without actually making contact with it. Does anything happen to either your hair or your balloon? Are they attracting or repelling each other? What does this mean about the electrical charges of the two surfaces: your hair and the balloon? Note your findings in clear and specific language. You might want to consider making a chart and mapping your results for each experiment so you can compare them easily.

Control Group 2:

Hold your balloons by the ends of their strings, letting them dangle. Move them closer together until they are almost touching. What happens? Record your findings. Now you'll change one or more aspects of your control groups and compare your new results with your original ones.

Experiment 1:

Each of you rub a balloon all over your hair. Cover the entire surface of the balloon and your whole head too. Slowly pull the balloon away from your head and write down what happens. What does this mean about the charges on the surfaces of your hairs and balloons?

Experiment 2:

Now, rub your heads with the balloons again and dangle them each from the ends of their strings. Slowly move them closer together. What happens this time?

Do they attract or repel each other? What does this say about their charges?

Variations:

Now put your hand between them. What does this do?

Now with a socked hand, rub down the two balloons again and let them hang by their strings. What happens this time when you move them together?

Take charge and make up your own variations on this experiment, but make sure to record your findings and always note how it affects the state of electrical charges.

Q&A

Q. What part of your job is most difficult and what is most rewarding?

Gloria T., a molecular biology research associate focusing on cancer studies in San Francisco, CA says:

The most difficult part of doing biology research is the slow process of getting results. Many times it takes months to successfully achieve an accurate answer to a minor question.

Usually, a series of small steps (successes as well as failures) is needed to obtain an answer to the big problem. Research can be frustrating because there are so many factors to take into account. It takes time to sort out what data is consistent and true as opposed to what is not.

The most rewarding part of this work is having a hands-on role in helping to cure human disease. I get a lot of satisfaction in working to achieve a common goal in helping people fight cancer. Basic research also keeps my interest because there is always something more to learn.