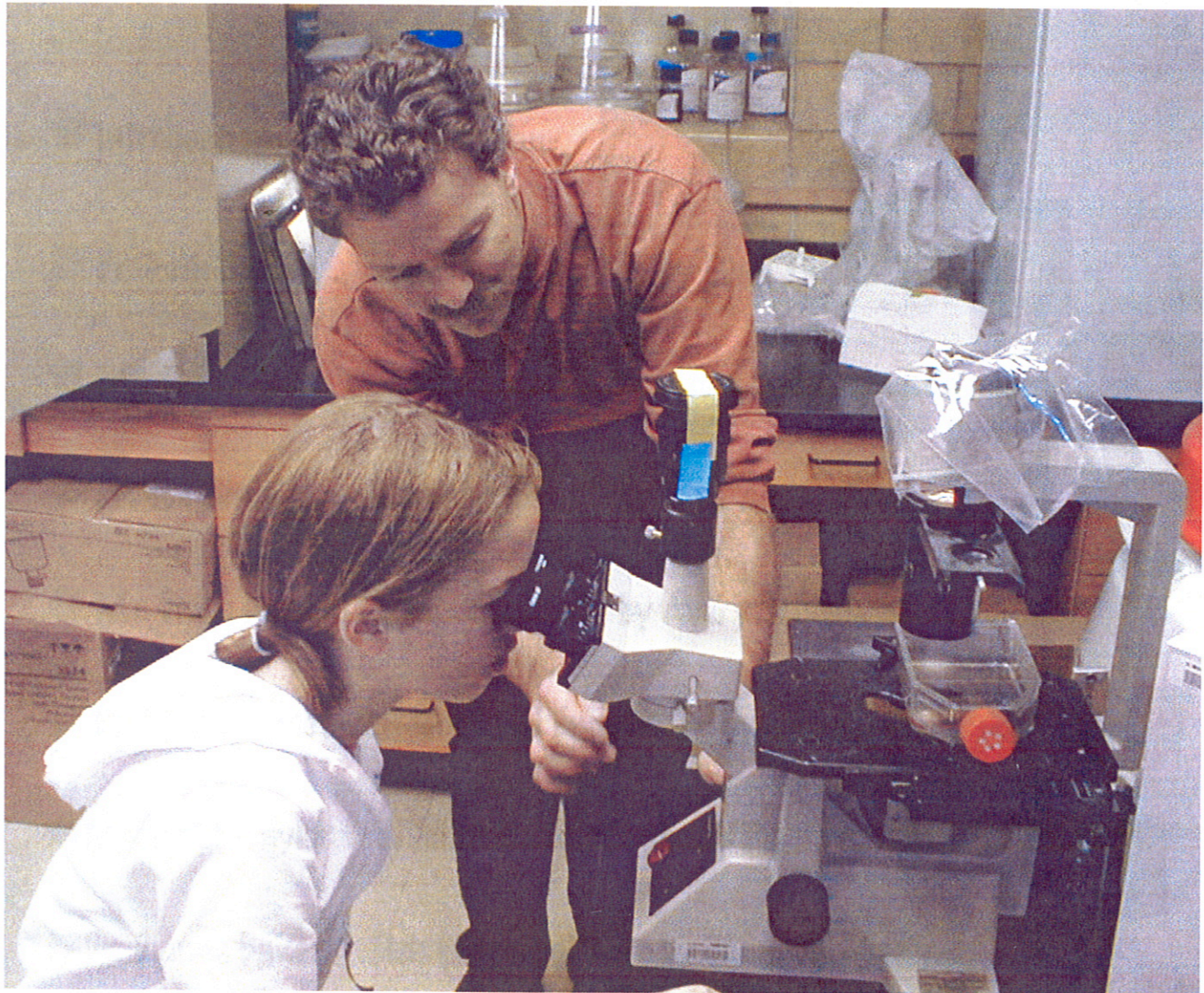


Meet Local Scientists

A Book For Kids, By Kids



***Interviews with scientists from the Pioneer Valley
By students from 5th/6th East Class,
Shutesbury Elementary School
Shutesbury, Massachusetts
2003-2004***

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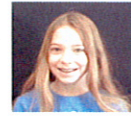
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Introduction

This book is a product from a five month study of science and local scientists done by the 5th / 6th East Class at Shutesbury Elementary School in Shutesbury, MA. Our study included lots of hands-on science labs, such as caring for and experimenting with Red Efts, testing everyday household liquids with Ph strips, and recording and testing rocks in geology labs. We've taken notes on many in-depth lessons, ranging from geology to electric motors, and natural elements. We wanted to be sure that before we met up with local scientists, each student had a beginning background in biology, physics, scientific method and experimental technique.

Each student selected a local scientist to contact for an interview. Every individual student E-mailed or called his or her scientist and arranged a time to meet for an interview. These interviews took place over the weekend, during school, and after school. Excited and nervous, we set off to our scientist's place of work, some of us with partners. For each of us it was a different place of work: some of us went to labs, some to the woods looking for bears, some of us near dangerous bio-hazard labs, and some of us simply went to our scientist's homes. In each place we visited, we asked and learned a lot about our scientist's life, research, and branch of science. We took pictures with digital cameras, took notes and some of us brought tape recorders to catch small details. After the interview we came back to class and presented what we learned about our scientist. We downloaded the photos we took and answered questions about our scientist's research and life.

Our class wrote this book for many reasons. First our class was excited about learning about science, and we wanted other kids to share that experience. This is our way of sharing what we know, through a book that will inspire kids to realize that there are so many possibilities and career choices in science, and they're right at our doorstep. We hoped that this publication would show kids that local scientists are open and willing to help kids know more about science, and show how interesting it can be. We thought maybe that this would make more schools curious, and that would encourage them to reach out. The same type of study could be done with other careers, such as writers or historians or mathematicians. We hope other schools might take interest in this. Last of all, we wanted to celebrate the local scientists of our area and the wonderful, important work scientists do around our own homes.

By Sara Klugman

ACKNOWLEDGEMENTS

We would like to thank many people for their help and support in making this book possible.

We would like to thank the scientists who worked with us, and those who offered to work with us. They welcomed us into their laboratories, homes, or outdoor work sites, and took time out of their week to teach us about their studies and their work.

We would like to thank all our parents, grandparents and friends who supported our work. They helped us with transportation and our interviews. They helped us with note taking, pictures, and the preparation of the presentations. Without you this book would not be possible.

We would like to thank Lori Seaver, Shutesbury Elementary School Computer Teacher, who took time out of her schedule to help us through every stage of this project.

We would like to thank Ms. Tari Thomas, Principal, and Dr. Linda Driscoll, Superintendent of Schools for their letters of support.

Lastly we would like to thank the Amherst Area Educational Alliance for funding our student-written grant proposal that allowed us to print and distribute copies of this book to all area schools and libraries.

By Kira Gallagher for the 5th/6th East Class of 2003-2004,
Ron Berger, Teacher

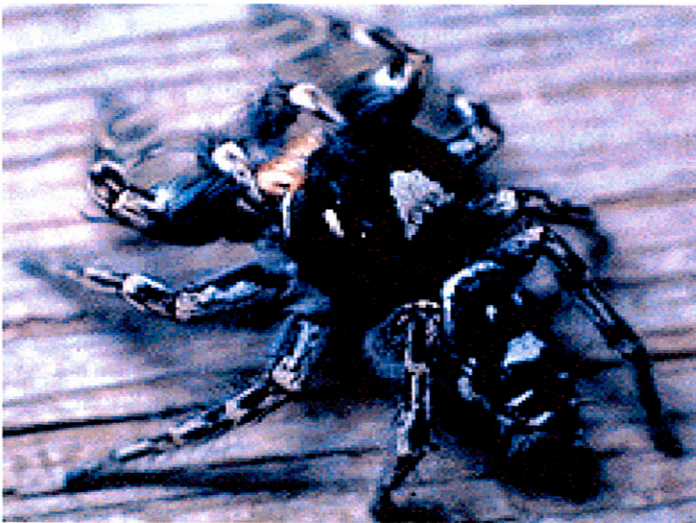
Dr. Elizabeth M. Jakob

ARACHNOLOGIST



What is Arachnology?

Arachnology is the study of arachnids. Arachnids include spiders, ticks, and more. One of the main features of arachnids is that all of them have 8 legs.



↑ ↑
This is the species of jumping spider that Dr. Jakob studies. It is called *phidippus*.

Background

Education

- Undergraduate work at Cornell University.
- Graduate work in Biology.
- Ph.D. at University of California in Davis.

Place of Work

- Associate Professor of Psychology at University of Massachusetts.

Brief Current Job Description

- Works to figure out how smart spiders really are.
- Spiders thought to be stupid. How stupid are they really?
- Uses many relatively simple experiments.

Goal

Dr. Jakob's goal is to understand how spiders learn: many thought that mammals could learn behaviors, but not things like bugs, insects, spiders, etc. Beth hopes to discover if that is really true. Are spiders smarter than people think?

Research and Work

In order to discover the true intelligence of spiders, Dr. Jakob uses a number of simple experiments. These experiments test the spiders' touch, smell, hearing, and most of all, sight. She does the experiments not only to find out what the spiders are able to sense, but also to find out how they react to what they sense, how much they pay attention to their senses, and how much they rely on their senses. One experiment that Dr. Jakob used to test the spiders' memory of colors and lefts and rights was very simple, as most of her experiments are. It contained 2 wooden cubes (one blue and one red), a "T" shaped enclosed area, and a dead cricket. The cubes are stuck on opposite sides of the enclosed area with the cricket stuck on the back of one cube. The spider is then put into the "T". In time, the spider finds the cricket. They continue this test once a day for 10 days. The cricket and the cube it is on are randomly assigned to one side or the other each day. If the spider finds the cricket faster and faster each day, it shows it can memorize colors. In the other version of the experiment the food is always on the same side, but not necessarily behind the same color. This tests the spiders' memory of lefts and rights.



Did You Know?

- The eye of a spider is a lot like a human eye, and less like most other bugs.
- Male Jumping Spiders do a distinctive dance when courting a female. The dance is quite coordinated, and looks like a series of disco moves. If the female doesn't like the presentation she will attack, and usually kill the male.
- All spiders have 8 eyes, but only two of the eyes can see clearly. The other eyes are used as peripheral vision, and to sense light.

Fred Morrison

Zoologist

What is Zoology?

Zoology is the study of animals.



Background

- Went to area public schools
- Graduated from University of Massachusetts, where he got a Bachelor's degree of science in Geology
- Did not become a geologist, instead became a middle school biology, physics and earth science teacher
- Finished a Masters Degree while he was teaching
- Taught science education courses in local colleges
- Worked part-time as a property manager at MassAudubon's Arcadia Wildlife Sanctuary
- Took an early retirement from his teaching job in 2001
- Leads natural history tours to Costa Rica and Mexico
- Now works as a consulting biologist
- Also works as an editor and scientific consultant for the radio series "Field Notes" produced by his wife, Laurie Sanders. He and Laurie are the proud parents of 3-year-old Lydia.
- Owns a home in a Costa Rican cloud forest which he and his wife and other scientists use as a base for research

Childhood

Growing up, Fred's parents were very supportive of him. They thought that whatever he chose for his career would be great! These days he is very happy that he chose to be a scientist!

Did you Know

That dragonflies start out as nymphs that live underwater for one or more years. Then they crawl up onto the shore, shed their skins and fly away as winged adults.

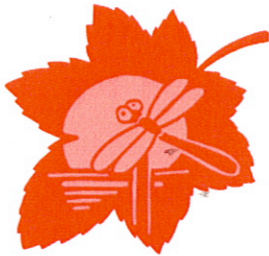
Expert in:

- Butterflies, especially Monarchs even going to Mexico to study them at their over-wintering colonies
- Fresh water mussels. He and a colleague recently found a population of endangered mussels (not seen in MA for 12 years) that was thought to be extirpated
- Reptiles and Amphibians (especially snakes!)
- Dragonflies and damselflies. He and his wife have been studying and collecting dragonfly skins for the past 8 years.
- Ants, his latest passion. He hopes to become good at this in a few years



Equipment

- Nets
- Microscopes
- Boots
- Plastic bags
- Field guides
- Tupperware
- Scuba diving gear
- Science test tubes
- GPS units

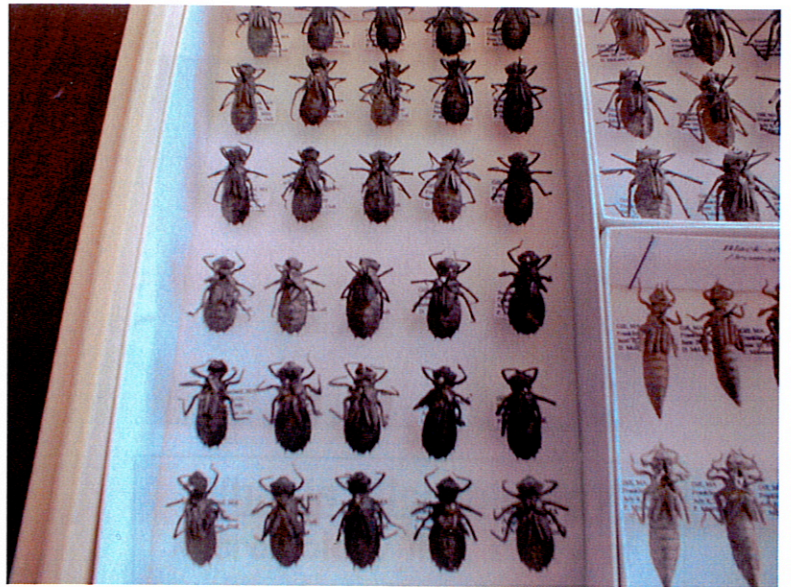


Fred's Work With Dragonflies

Fred studies dragonflies and the skins of nymphs. After their aquatic lives, the nymphs crawl out of the water, shed their skins (called exuviae) and fly off as adults. Fred collects and identifies these skins to learn about what kinds of dragonflies live at any particular body of water. He has mounted a small part of his skin collection in glass cases seen below. Under the skins are tiny labels that tell when, where, and by whom the skins were collected. Fred and Laurie estimate that they've collected 15,000 skins so far.

Field Notes On WFCR

If you would like to listen to Fred and Laurie's radio show on WFCR public radio, 88.5 FM, tune in every Monday morning at 7:35. The show is hosted by Laurie Sanders.



Dragonfly skins

Environmental Protection Work

One type of job that Fred and Laurie do involves construction sites. If it turns out the site might include the habitat for a rare species they sometimes get called in to check to see whether or not the construction will have any sort of negative impact to the habitat. This could affect the building plans. Or even, in some cases, stop the project. They also do before-and-after surveys to see if certain kinds of construction projects are a problem in terms of a habitat of rare species. For example, some eroding sections of the river bank along the Connecticut River were recently bio-engineered in an attempt to stop the erosion. Fred and Laurie studied the changes in the kinds and numbers of dragonflies (including several rare species) that came ashore both before and after the engineering work and then offered suggestions on how to improve future bank stabilization projects.



Joe Jerry

Microbiologist



Background

- Went to the University of Vermont, got Bachelors degree
- Went to Purdue University, Indiana. Got Masters degree
- Went to Penn State. Got PhD
- Spent six years, post doctorate training at the Jackson Laboratory and Baylor College of Medicine.

What is Microbiology?

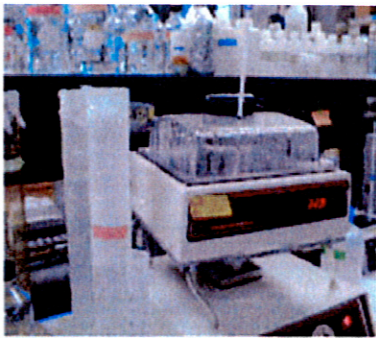
Microbiology is a study of science including things that are microscopic, so you have to look at them through a microscope. Since the last part of the word is biology, it has to be living.



Some liquids in his lab

Research and Work

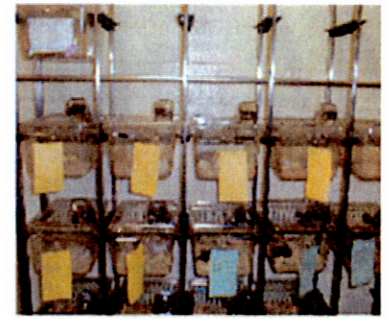
A lot of scientists right now are trying to stop breast cancer. This is what he does, but instead of trying to cure it after it happens, he tries to prevent it before it happens. Mostly, his work is based on mice. He tries to create cancer in white mice and black mice. He's found that in his sample group, white mice get cancer at a much higher rate than black mice. He's looking at the genes of the mice to find out which gene is connected with breast cancer. Almost every day he has to write grants to National Institutes of American Health and companies so that he can have money to do experiments. Sometimes he gets funded; sometimes he doesn't.



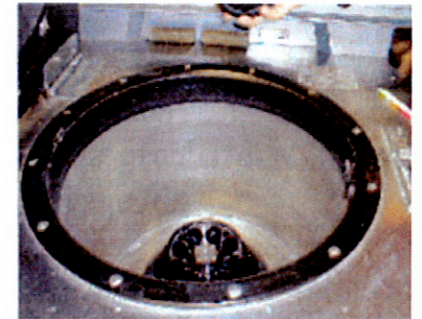
The "Belly dancer"

Equipment

1. "Belly dancer" - for keeping liquids hot.
2. Microscope- for looking at microscopic objects.
3. Mice - for mixing genes and doing research.
4. Centrifuge - for separating liquids.
5. Radiation detector - for detecting radiation.



Mice in cages



Centrifuge

Other Research

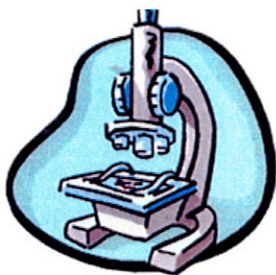
He was part of a team that cloned a cow. His team was competing with Dolly (the sheep that another was using to clone.) They fell behind and Dolly's company won.



A view through a microscope of the tissue of a mouse with breast cancer.



The microscope



Goals

His one goal is to prevent breast cancer and help womankind.

Childhood

He wasn't interested in science as a child. He wanted to become a doctor. The equipment at his college inspired him.



A baby mouse

Faith Deering

Entomologist

Childhood

When she was a little girl she would keep a lot of different bugs in the house as pets.

Her father was a scientist so she could always ask him questions. She was always interested in science. Her favorite type of science is natural science. One of her favorite things to do was to turn over rocks and see what was under them. She loves the outdoors and she is not afraid of anything... well, almost; she is afraid of snakes.

Faith holding a basket of silk worms



What is Entomology?

Entomology is the study of insects

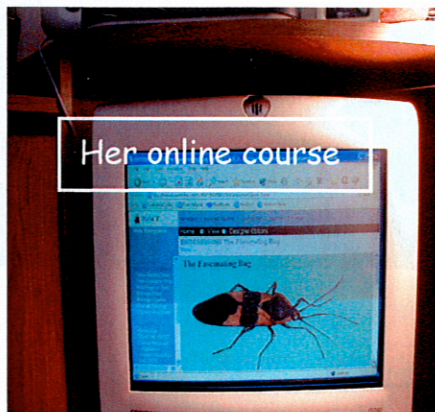


The hissing cockroach

Background

Education

- } Undergraduate: Mills College, CA
- } Graduate work: University of Massachusetts
- } She used to be a 1st grade teacher



Her online course

Online Course

She teaches an online course called "The Fascinating Bug" that is sponsored by Montana State University. She teaches teachers and their students across the United States.

Other Animals

Faith has a lot of different insects in her office and most of them are models or dead. On the right is a preserved Asian Leaf Insect

The Asian leaf insect

The Asian leaf insect is from the rain forest



Work

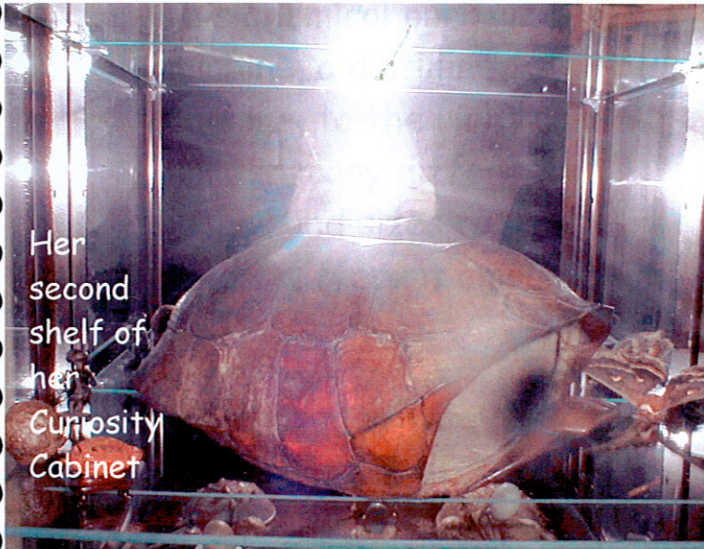
She works at the Smithsonian Institute in Washington, DC in the Museum of Natural History. She works in the bug zoo where she feeds and cleans the bug's cages. Every once in a while she has to set up a rolling cart for other workers to take out the bugs and show the kids and parents the insects.



Her first shelf of her Curiosity Cabinet

Faith's Research

Faith is doing research on the feeding behavior of insects. She is trying to find out information on the insect feeding behavior of milkweed bugs. She is researching to see if the milkweed bugs like different seeds. On December 18, 2003, she was seeing if the milkweed bugs would eat the milkweed seeds. Almost all of the bugs were on the milkweed seeds and they were eating them. On the 19th 2003, she put sunflower seeds in the cage and wanted to see if the bugs would stop eating the milkweed seeds and go to the sunflower seeds, or not do anything about them and keep eating the milkweed seeds. Her hypothesis is that the milkweed bug will always choose milkweed seeds.

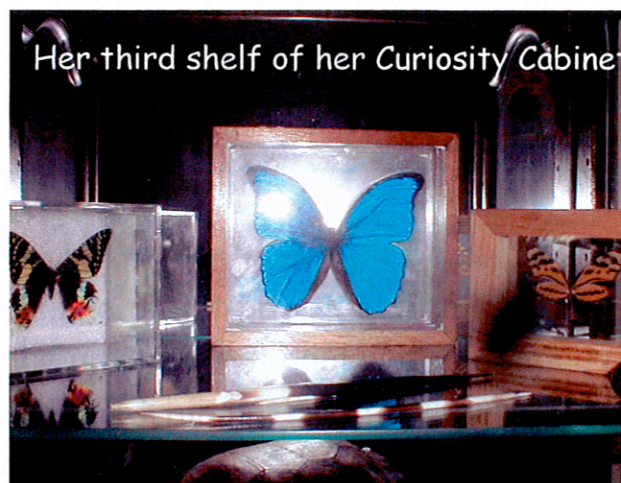


Her second shelf of her Curiosity Cabinet

Her Curiosity Cabinet

When Faith finds something that she likes then she puts it into her case. These pictures are her three shelves

Her number 413-584-7137.
Call her if you have other questions.



Her third shelf of her Curiosity Cabinet

Dr. Michael F. Malone

Chemical engineer



What is Chemical Engineering?

Chemical engineering is the preparation and purifying of chemicals for manufacturing.

Did you know ...

This chemical purifying machine, a distilling machine, to the right can come in many different shapes and sizes to handle different amounts of liquids.



Fun facts

There are differences between chemistry and chemical engineering. Dr. Malone says: "Scientists invent things and engineers make them better."

Background

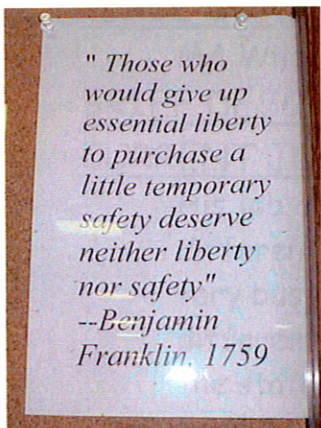
- Went to Scranton High
- Works at University of Massachusetts teaching and conducting experiments.
- Got his PhD in chemical engineering at Penn State College.
- Got his Bachelor's degree at Umass.

Childhood

- Dr. Malone didn't have any interests in science until high school where some of his teachers got him interested in chemistry, science, and physics.

What is distillation?

➤ Distilling is a process that purifies chemicals by boiling them to turn them to vapor, then condenses them back to a liquid. This machine to the right distills water to make the water exactly neutral for use in experiments. All liquids have a value on a scale from 1-14 called the pH scale. This shows whether they are acidic, basic, or neutral. Pure water or distilled water, has a pH of 7, but most rain water and drinking water is a bit acidic because of pollution. The distillation machine produces distilled water with a perfectly neutral pH of 7.



Above: A saying from Ben Franklin in 1759.

Research & work

Dr. Malone says that he spends 10% of his typical workday doing administrative work and his other time equally split between teaching at Umass and conducting and preparing experiments with his students. 2/3 of his work is using computer models.



Above Dr. Michael Malone sets aside a project for a while to be interviewed by a certain someone.



In the picture above you can see the building at Umass where Dr. Malone works.

RALPH TAYLOR

WILDLIFE BIOLOGIST



BACKGROUND

EDUCATION

- Enfield Public High School in Enfield, Connecticut.
- Went to the University of Connecticut and got an undergraduate degree and a Bachelor of Science in zoology and wildlife.
- Graduate school for two years at the University of Massachusetts and received a Master's Degree.

PLACE OF WORK

MA Wildlife in Belchertown, MA.

BRIEF DESCRIPTION OF CURRENT JOB

His job consists of a lot of different things and he's always very busy. He works with many different kinds of animals all over the state, especially bears. He tracks down bears all over the state with something called 'radio telemetry'. He's responsible for 1/5 of all wildlife in MA.

WHAT IS WILDLIFE BIOLOGY?

Wildlife biology is the study of the ways animals live in their natural habitats. Wildlife biologists may also study plants. Mr. Taylor studies plants, but mostly focuses on animals.

RESEARCH AND WORK

- Mr. Taylor's job is also a political job. A lot of angry citizens complain about animals wrecking their property. Some people enjoy seeing the animals. Mr. Taylor's right in the middle of it all.
- Mr. Taylor has a big responsibility. He's in charge of 30,000 acres of wildlife!
- Mr. Taylor also works with fish. He goes from one pond to another using one of his special devices to calculate how many fish are in each pond. If one pond has a lot less fish than another, it might be polluted.

CHILDHOOD

- Mr. Taylor had always loved science as a kid, not one specific thing had really gotten him interested in it. Although, at about age six, his parents bought him a crystal radio set, and that did have a good influence on him becoming a scientist.
- Even when he was a kid, everybody around who found a sick animal would bring it to him. He grew up in Enfield, C.T.

RADIO TELEMETRY

Radio telemetry is a very interesting technique. There are two parts that are connected in radio telemetry. One part you hold up and the other part tells you how much signal you're getting, which bear you're tracking down, and a number. That number would come in handy later. The bear we tracked down was named Terri. We had to hold up one part and point it in different directions until we got the most signal from the other part. We memorized the number it gave us, in our case 86. Then we went to Mr. Taylor's laptop. We looked at a map of Northampton, where we were, and we had to move a red line until, at the bottom of the screen, it read 86. We left that line where it was. Then we did that whole operation at another place and got a number. We figured out where the red line was supposed to go. Where that line and the other line intersected, was where Terri was. It turned out she was just a football field away from us! We didn't want to go near her because we didn't have the right equipment.



This is a picture of Mr. Taylor, my friend, and me using the telemetry. I'm holding up one part and my friend is using the other.



This map is from Mr. Taylor's laptop. Where those three lines meet, is where the bear is.

On the right you can see that sometimes Mr. Taylor looks at bear's teeth to see how old they are. I don't know how he does it.

DID YOU KNOW?

There is a very interesting way that Mr. Taylor catches turkeys. He attaches a net to a rocket, and launches the rocket. It goes very, very far over a field. The net opens up and catches the turkeys. Pretty weird, huh?



Dr. Dianne Baker Fish Physiologist



Background

~Place of Work

- U.S.G.S Conte Andromedous Fish Research Center.
- University of Massachusetts, Amherst, MA

~Education

- Spent 1 year at Vanderbilt Univ. Transferred to The Evergreen State College in Washington for her B.S.
- M.S. and Ph.D. at Washington University.

Equipment

PCR DNA sequencing machines, Microscopes, Computers, Micotome, Fish tanks.

Childhood

- Dianne has been interested in science for as long as she can remember. She used to dissect fish when she was a kid.

What are hormones?

Dr. Baker's research is centered on how hormones in the brain control things like growth and reproduction in salmon. Hormones are molecules that are in one tissue or organ, such as the brain, and travel to another organ or tissue, and signal that tissue to repond. For example, in teenage years, humans go through a stage called puberty where hormones tell their body to change in lots of ways, such as getting taller, changing voice, changing body odors, hair, and becoming more moody.



Microscope

Goals

Dr. Baker wants to get a faculty position as a

What is a Microtome?

A Microtome is a machine that cuts things into little slices so you can put them under a microscope. You need to cut them so they are translucent. (Translucent is when you can't see through it, but if you hold it up to a lamp, you will be able to see the light going through it.) Once they are translucent you can see the microscopic things. Dr. Baker uses this machine to slice fish brains at low temperatures. Other scientists use this machine to slice rat brains and other tissue.



Microtome



PCR Machine

The machine to the left called a PCR machine. It is used to expose DNA or RNA to high and low temperatures. But she does not put the whole brain in. This machine amplifies (makes copies of) the DNA or RNA molecules.

Dr. Baker's Research

Dr. Baker examines brain tissue from salmon to find the effect of hormones. She is interested in how hormones affect growth and reproduction.

Radhika Geonka

ASSISTANT IMMUNOLOGIST

What is Immunology?

Immunology is a branch of biology (life science). It's the study of the body's main defenses. Every living thing is made of proteins. When a foreign protein or bacteria enters the blood stream, the body reacts. Radhika's work is focused on how the body reacts and to the foreign bacteria and developing vaccines to make that person more immune or resistant to the bacteria.



Childhood

Radhika was born in India. She grew up in a family with strong, well-educated women. Her family encouraged her to to have a career in either medicine, engineering, or science. When she was a junior in high school, she took a class in biology. Once Radhika got a taste of science, she was inspired to pursue further studies. This was the beginning of her preparation towards a career in science.

Education

- Radhika got her Bachelors degree in microbiology at The University of Massachusetts. Also, she got her second Bachelors degree in biochemistry at Umass. Currently, she is involved in a Masters program in animal science.

Place of Work

- Radhika is working on the Umass campus, in Paige Hall.

Job Description

- Radhika is working along side Dr Cynthia Baldwin as a research assistant.
- Her project is studying a bacteria called Brucella Abortus that causes a disease, Brucellosis. Cynthia Baldwin and she are working to better understand this disease. Once their understanding is more complete, they hope to develop a vaccine.



(From left) Kim Stankiewicz, a graduate student, my partner Chloe, me, and Radhika.

Research and Work

As you know, Radhika's study is focused on a particular bacteria, **Brucella Abortus**. This Disease is very, very dangerous. It can be spread through milk, urine, and through people who work with the animals that are infected with Brucellosis. Though there is no certified or general human to human transmission, it is still very dangerous to work with. Radhika's particular job is creating injections of Brucella Abortus to inject into the mice. She doesn't like hurting the mice. It's very important research. After the mice are infected, they go into a special room, and Radhika works to look how the disease effects the mouse. The disease cripples the mouse, and stays with it forever meaning it's a chronic disease. Radhika works by a machine called a Hood. A hood sucks up air, so Radhika isn't infected by the disease. She is very brave to take on this job.



Mice that Radhika infects.

Did You Know?

- Radhika's work is so dangerous, she needs FBI clearance to work with the bacteria.
- The bacteria could be used as a bio-hazard, meaning it could be used as a weapon.



Radhika pointing to an autoclave

Equipment

- **Centrifuges**, that spin very fast to separate cells.
- **Incubator**, a controlled environment with a consistent temperature used for keeping cells alive.
- **Thermocycler**, a device used for making DNA larger.
- **Gel box**, separates DNA to see if you've made the right DNA bigger.
- **Autoclave**, a high pressure, high temperature steam chamber that kills fungus and bacteria.
- **Sonicator**, that produces high frequency vibrations.

KIM STANKIEWICZ

ASSISTANT IMMUNOLOGIST



What is Immunology?

Immunology is the study of the immune system and how it functions to protect an organism from disease.



Background

Kim is a graduate student going for her Master's degree in animal science. She works with Doctor Sam Black at the University of Massachusetts as a research assistant in immunology. Their work is focused on a disease called laminitis in horses.



↑ Above ↑

This is a picture of a lot of equipment that Kim and other assistants use.

Research and Work

Kim's area of research is based mainly on laminitis. Laminitis is a disease in the horse's hoof. Neutrophils are white blood cells. They are taken from the horse's blood to study. They're the most common white blood cell. She studies them and then tries to relate it back to the disease. She tests them with chemicals.

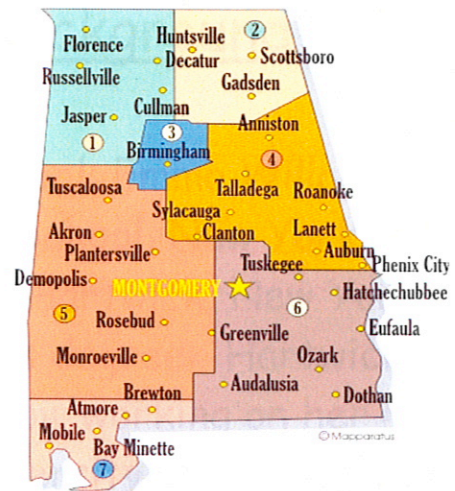
Travel

The only place Kim has traveled to is Alabama to work with horses, and to the barn.



Childhood

As a child Kim always wanted to be a vet when she grew up. Then she got interested in horses. I guess it pretty much worked out!



Equipment

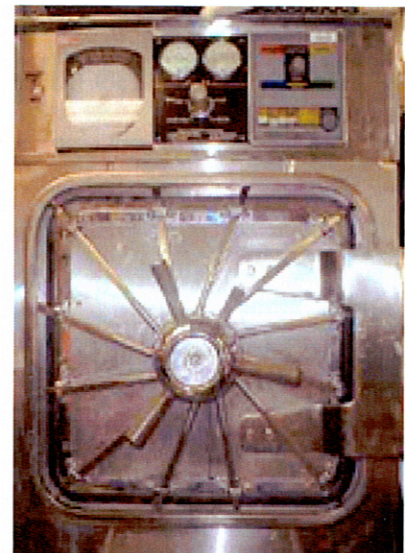
Kim and others use:

Gel boxes: to separate DNA.

Steam heat tape: If it turns black that means that it has been in the autoclave.

Autoclave: used to sterilize equipment.

Hoods: hoods keep the DNA or whatever they're working with away from them.



↑ Above ↑

This is an [old broken] autoclave.

Ms. Victoria Jacobson

Archeologist



This is Ms. Victoria Jacobson

What is Archeology?

Archeology is the study of cultures and places through finding evidence by studying, digging in, and analyzing sites.



This is the U.S. Fish and Wildlife building in Hadley, MA

Background

Education

- High school: Emma Willard
- Private School, New York
- College: Hartwick, New York.
- Masters degree: Hartwick
- She is now working on her PhD at the University of Massachusetts

Place of Work

US Fish and Wildlife, Hadley, MA

Research and work

Ms Jacobson goes out to different sites in Western Massachusetts and researches the stuff she finds. If she finds something important she tries to prevent the site from being destroyed. One time she dug up an 8,000 year old deer bed. Ms Jacobson also travels for work she can work in thirteen states northeast as in Connecticut.

Childhood

When Ms. Jacobson was young she wasn't really interested in science until she saw a special about archeology. When she was done watching TV she went outside. She dug up rocks and made a display on them. Since then she's been interested in science.



This is a picture U.S. Fish and Wildlife in Hadley, MA

Equipment

trowels,
shovels,
brushes ,
metric tapes ,
soil book ,
computers.



This is the author on the bottom floor of the Fish and Wildlife building. Behind me are pictures of ducks. I think they're making a small exhibit on them.

Goals

Ms. Jacobson's goal is to become a better scientist in archeology. She hopes to succeed in the job she has now.

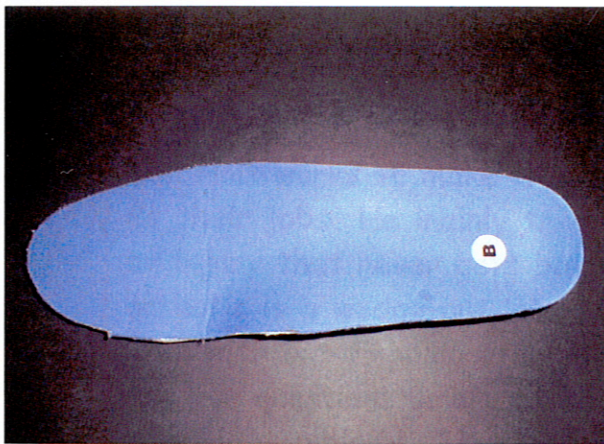
Ken Holt

Exercise Biomechanics



What is Exercise Biomechanics?

Exercise Biomechanics is the study of how people move.



An orthotic that Ken made.

Equipment

- The Grinder, which is used for shaping the orthotics.
- His computer
- Goniometer, which measures angles of the foot and the wedge in the shoe.
- Material for the orthotics. (Nickelplast, rubber, sponge material, epoxy)

Background

- Ken works to try and make it easier for people to move without pain, by studying their feet, and making orthotics.

Education

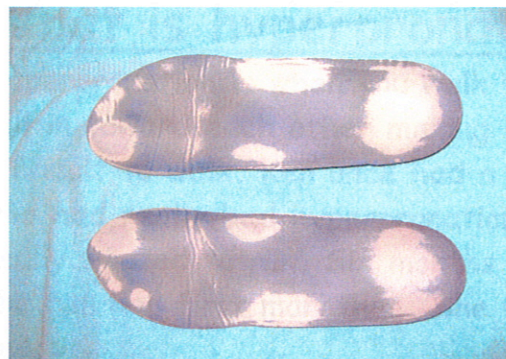
- Bachelor's Degree: University of Nottingham, England
- Master's Degree in physical therapy: Boston University
- Master's Degree in Exercise Science: Penn State
- PhD: University of Massachusetts

Place of work

- Professor at Boston University
- Has a home office in Shutesbury, Mass

Did you know?

There are 26 bones in the foot and over 100 muscles!



An orthotic that Ken made that's really worn out.

Childhood

Ken grew up in England. He really liked sports. (He still does.) Since he liked sports so much, he based his job around sports. The reason he picked his job was to get better at sports, and to get injured less.



An orthotic that Ken made.
(From the side view)

Goals

Ken's goals are to grow his business, look into how kids move, run a lab and work full time. He also wants to teach more.

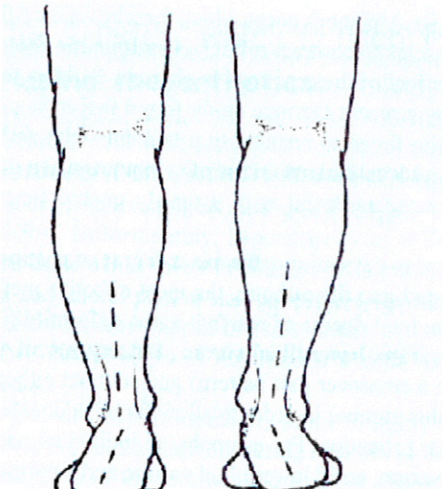
Travel

Ken works in two places, his office at home and in Boston.

Research and work

Ken Holt works to make it easier and less painful for people to walk, run, and do their jobs. He mainly treats people with chronic injuries. A chronic injury is an injury that never gets better. How Ken helps is he makes orthotics. An orthotic is a wedge put into a shoe to fill up the extra space so people can walk with out flopping around. If you were to go and see Ken, first he would ask you questions among other things, and about your family's history, if they had foot problems. Then he would do a head to toe examination. (To see if the foot is the problem, or being overweight or other body problems.) Then if necessary he would build you an orthotic.

This is a picture of what hyperpronation looks like.



What is hyperpronation?

Hyperpronation is when you walk your feet roll in toward each other making it very difficult to walk. Ken once had a client who had really bad hyperpronation but she really wanted to run. Six months later, she ran her first marathon. She was really happy.

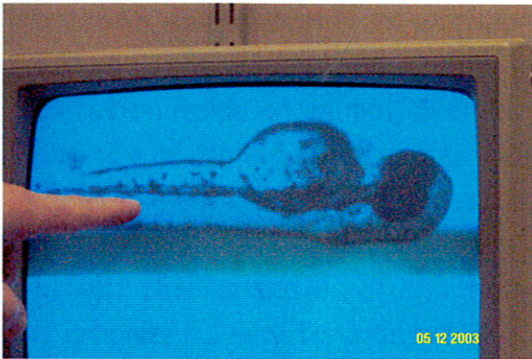
Rolf Karlstrom

Rolf Karlstrom

Zoologist



What is Zoology?
Zoology is the study of animals.



This is a Zebra fish after it hatched. You can see inside it.

Favorite Experience

Dr. Karlstrom was studying how nerves connect in the Zebra fish, and he found a mutation in the wiring of the brain. He was able to name these mutations because they hadn't been discovered yet.

He made a movie of the development of a Zebra fish embryo, which has been on T.V., made into a flipbook, and even put in a textbook!

Background

Education

- BS in Flagstaff Arizona
- PHD at the University of Utah
- Post Doctorates, two in Germany, one at New York University (NYU)

Place of Work

- University of MA. Biology Department

Childhood

His father and brothers are all geologists. His father was working on moon geology. He got to talk to the astronauts while they were on the moon.

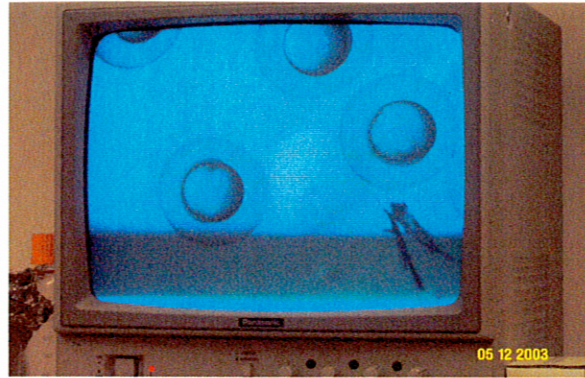
Research and Work

Rolf Karlstrom works with zebrafish. These fish are very small, like large minnows and eat tiny shrimp. Dr. Karlstrom has **over 700 tanks of zebrafish!** That's a lot of fish! Dr. Karlstrom studies brain formation in embryos, genes and evolution.

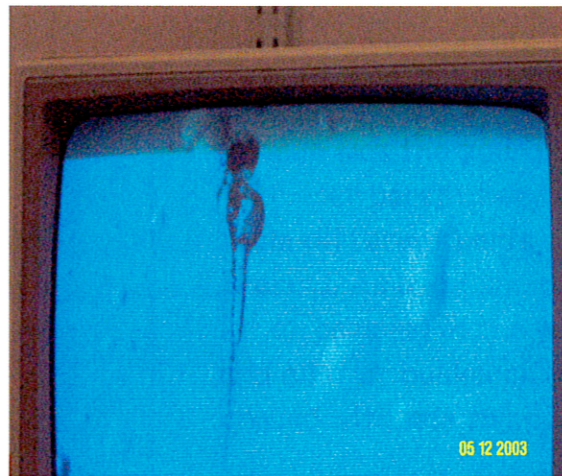
The theory of evolution is based on the idea that birth mutations, which mean a baby individual that has a change in its genes that makes it different than usual, can be useful as well as a problem. Some mutations work well for the animal's survival, and if a mutation helps an animal, over large periods of time a new species may develop. Mutations can be created in zebrafish, and how mutations affect the formation of an embryo is a powerful way to understand how genes function.

Dr. Karlstrom watches the Zebrafish and their mutations-with possibly 70,000 fish there are bound to be some mutations. Some mutations cause differences in the body, like having spots instead of stripes, or big, flowing tails. Some mutations affect things in the brain, like having the nerves in the eye go to the wrong places.

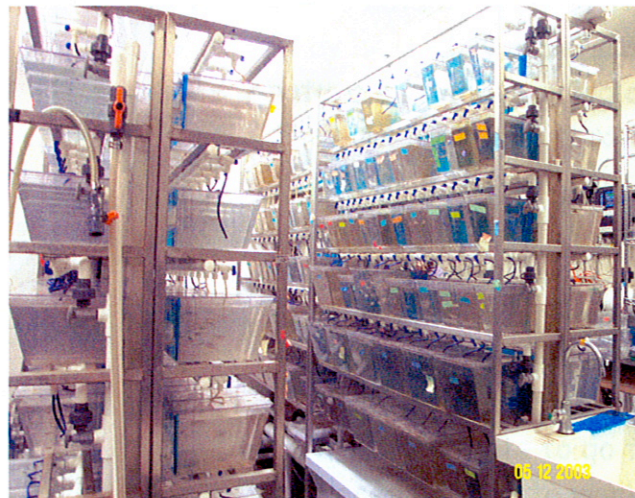
Dr. Karlstrom has eight people to help him. He is interested in the process of how an embryo develops, developmental biology, and especially the way the brain develops.



These are some Zebrafish eggs.



This is a Zebrafish after it hatched.



This is a picture of the tanks of Zebrafish.

Colleen Kelley

Naturalist



Background

- ❖ Colleen trained with National Outdoor Leadership School (NOLS) for credits towards a Bachelor's degree. With these and her credits from the University of R.I. she got the degree in National Resources.
- ❖ Internship Project was with Alton Jones Environmental Center. Kids came and stayed for a week. Colleen taught them about the outdoors.
- ❖ When Colleen was done with that she got a job at Talcott Mt. Science Center. She was the science teacher and the PE teacher.
- ❖ Now she works at the Hitchcock Center for the Environment in Amherst, Mass. as a teacher. A lot of classes do field trips with her and she often goes into schools and gives presentations.

Childhood

Colleen was the youngest of four. Her parents were from different parts of Ireland. As a kid she did a lot of camping in the woods, and a lot of backpacking around with her family.

What is a Naturalist?

A Naturalist is someone who works outside most of the time. They help us to understand nature and what's going on in it. They work to keep it safe. A lot of the time they work at places like the Hitchcock Center. They work with animals some of the time, and some of the time they work with people. They're sort of like a Ranger at a national park. Colleen gets to go to a lot of places outside to work, instead of staying in a stuffy office to work.

Did You Know?

That a certain kind of snow hut is called a quincee? Colleen stayed in one at NOLS. She also stayed in an underground cave for two weeks with her peers. They were mapping it out.

Research and Work

Colleen's research isn't the kind of work that you would expect to find in a lab, or a testing area. It's mostly based on kids, and helping them learn about and connect with the environment around them. For a while Colleen *did* work in the entomology (the study of insects), and she wants to do some more. She does a little of it in her work today.

Colleen teaches some classes at the Hitchcock Center. One is a parent and child pre-school that meets every Friday. She works with a bunch of college students who plan to become teachers. Colleen goes to schools a lot and gives presentations; sometimes she takes them on field trips. Colleen wrote a book about kids' activities outside; that's her favorite accomplishment. Her favorite thing about her work is going into ponds with kids. Once she found a water scorpion.

Colleen goes to a few conferences, but most of them are within New England. Most of them are a bunch of environmentalist teachers getting together to share new information and teaching techniques. Colleen's favorite conference is NEEEA, the New England Environment Education Alliance.

Equipment

Colleen doesn't use very fancy equipment. She thinks it's important for kids to make their own tools. Colleen does use a Stereo Scope. Besides that she uses containers, magnifying glasses, aquatic nets, nets used to catch insects, puppets used to tell stories, and live animals. Colleen has a lot of animals, and fish in tanks at her work. She also has a box turtle. These animals were taken by people that didn't understand the importance of leaving animals in the wild.



A Story

Once Colleen and her dog Memphis were taking a walk on their next-door neighbor's snowmobile trail when Memphis ran ahead with what Colleen thought was another dog. But when she finally caught up with them the "dog" was up in a tree and snarling at her. Memphis had chased a mountain lion up a tree and trapped it there. Colleen grabbed Memphis by the collar and ran back to the neighbor's house. Later when the neighbor went back with his dogs the lion was gone but the dogs went crazy from the scent.

Dr. Nancy Lowry

UNDERGRADUATE SCIENCE PROFESSOR



What is a Science Professor?

A science professor teaches science at a college or university. They also do their own science research.

Research and Work

Nancy teaches her students about molecules and does experiments with them. They use chemicals and compounds to create things. Nancy likes to do experiments to find the shape of molecules. She also likes to teach how the shape of a molecule will determine what it will do in a test tube or in the human body and in an animal's body. Nancy's students often do chemistry experiments with everyday substances, for example, they isolate caffeine from tea, or determine what makes peppermint tea taste like peppermint.

Background

- Undergraduate at Smith College.
- Ph.D at M.I.T.
- She works at Hampshire College.

Equipment

When Nancy is demonstrating what molecules look like she uses little plastic pieces like sticks, bent sticks, balls and other shapes. She also uses chemicals as seen in the picture on the right. The thing the bottles are in is called "The Hood". Nancy uses the hood to do the experiments with chemicals.



This is where Nancy does some of her work. It is called "The Hood."



This is Nancy and I making slime. Nancy is on the right and I'm on the left.



Nancy and I made a super ball. This is the ball on my hand.

Did you know?

Did you know that all snowflakes have six sides?

Did you know that a water atom has 2 hydrogen atoms and one oxygen atom?

Did you know that when you smell something little molecules of it are going in your nose?

Did you know that atoms are so small we can't see them though a very strong microscope?

Did you know that when two atoms join it is called a molecule?

Did you know that taste and smell are determined by the shape of the molecule?



This is the hall where Nancy's office is.



Dr. Alan Richmond

Herpetologist



Background

- PLACE OF WORK
 - Room 457, Morrill IV South, Biology Department, UMass.
- BRIEF DESCRIPTION OF JOB

Trying to find out cool stuff about Reptiles and Amphibians to convince people to protect them and care about them.
- EDUCATION
 - Dr. Richmond got all of his degrees in UMass; He got his Undergraduate B.S. in Biology at UMass, He got his Masters Degree in Wildlife/ Forestry/ and Fisheries all UMass as well; also he got his PhD in Biology at UMass, too.

Childhood

Dr. Richmond lived east of Springfield MA. In a place that was full of farms so they had tons of space to run around and try to catch lots of animals. His dad loved reptiles and amphibians and his mom was very tolerant letting tons of animals inside, so it seemed very obvious that Dr. Richmond would come up with the job of a Herpetologist.

What Is Herpetology?

Herpetology is the study of reptiles and amphibians! There is tons of stuff to do in Herpetology; you can try to discover new species, try to follow a certain reptiles' or amphibians' behavior and lots of interesting stuff. This scientific job can be both dangerous and danger free. But if you are very interested in science and reptiles or amphibians or both, this is the best job you could get!

- Equipment
- Net
- Gloves
- Hiking boots
- Good Microscope

Did You Know?

That Dr. Richmond had once found out that there was an endangered species of toad in a place where a building was about to be built! He told and convinced the builders to not build the building and he succeeded! Now the toads lived happily ever after!

Research and Work

Dr. Richmond's work takes place in and out of his lab. In his lab (room 457 Morrill IV South UMASS) he focuses on the natural history of reptiles and amphibians. He usually deals with the reptiles and amphibian's habitats, reproduction, habits, life patterns, requirements for life. For example: How did amphibians recolonize New England after the last ice age? And many people know that the box turtle is endangered and protected. But in New England almost nobody knows its habitat... or the home range of a box turtle or how many eggs females lay a year. Some amphibians that he has studied in depth are amphibians like the Mud Puppy (*Necturus Maculosus*) and the Four Toed Salamander (*Hemidactylum scutatum*, shown below) and last, the Spadefoot Toad (*Scaphiopus Holbrook*). He did a lot of research on these to protect and preserve habitats and environments that are needed for survival.



An Eastern Diamond Rattlesnake



A Four-Toed Salamander

What lives in the lab of this scientist?

If you have ever been in a zoo then you should kind of have an idea, because in his lab there are lots of animals to see. There is almost everything you can imagine: there are some snappy snakes, big skins, pythons, humongous toads, and big and small aquatic turtles. A live three-foot-long alligator lives in a tank in Morrill IV South Umass. The longest ever recorded modern reptile was a 33 ft and 7 inch reticulated python. Dr. Richmond doesn't exactly have one that big, but one at least 13 ft.

Jason Joy

Microbiologist

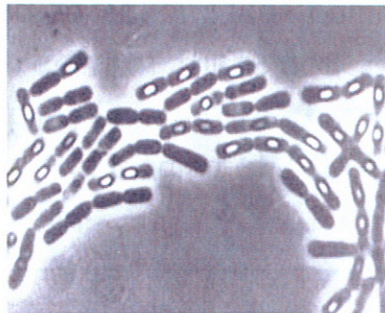


Education

He went to the university of Illinois for his Bachelor's Degree and his Master's Degree in soil science. He went to the University of Massachusetts to get his PhD in microbiology.

Place of work

Hampshire College
In the Cole building
Amherst, MA.



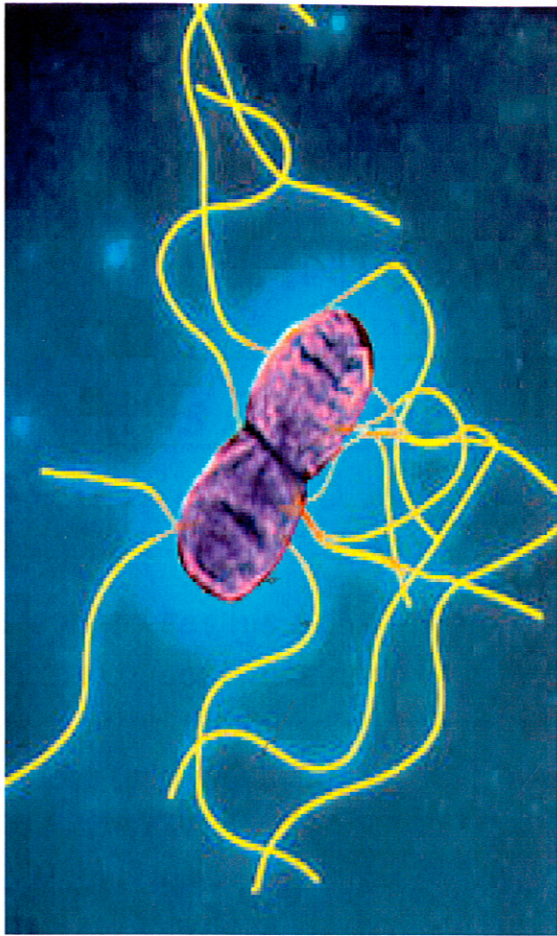
Clumped
microorganisms

What is microbiology?

Microbiology is the study of microorganisms, tiny living things that are found in every living thing.

Work and Research

In his lab, he creates conditions for microorganisms to grow, then he isolates them, which means he separates them so he can look at them alone under the microscope. He wants to observe how they react to things. His work includes teaching microbiology and researching microorganisms, and going to places all over the world to try to find research and find new microorganisms. He goes to places like Yellowstone Park, and near volcanoes.



Microorganism.



Microorganisms.

Discoveries

Most people thought that everything can only live at temperatures suitable for humans and that it was impossible to live at very high temperatures. But Jason Tor traveled to Yellowstone Park and discovered that there are microorganisms living in the hot springs near the magma at 1000 degrees Celsius!

Fun Facts

- Over 1 billion microorganisms can fit in your hand
- Microorganisms are as big as a grain of rice when magnified 400 times under a microscope.
- Microorganisms can be used to clean up dangerous substances. This is called bioremediation.

Lots of life

Microorganisms make up all life and there are about 100,000 microorganisms known. There are probably a lot that are undiscovered.

Stephen Bannasch

TECHNICAL ENGINEER



What is Technical Engineering?

Stephen uses his skills in electrical software and mechanical engineering to create educational materials.



Background

Education

- Stephen went to Hampshire College and got his bachelor's degree.
- Stephen did not go to graduate school.

Place of Work

- Stephen's company name is Concord Consortium.

Job description

- Works with a Palm Pilot. Tries to create new things for it.
- He and his group make science and math materials for education.

Research and Work

Stephen's work is to make more things for the Palm Pilot. He makes things like an electrical thermometer that gets the temperature quicker than other thermometers. He also made a thing that you connect to your shoe to measure your speed. This instrument is made of metal with a disk spinning around and the speed it spins is the speed you ran. Another thing he made was an instrument that measures force. It is made of metal. The wire that connected the instrument and the Palm Pilot was thin and broke the first time he let someone use it. He had to re-design the connections to make them stronger.

Other information

Travels

- Stephen travels for meetings.



This is a picture of the place Stephen works.

Equipment

- G4 power book and other computers
- Digital camera
- Palm Pilot



These are some neat computers Stephen has.

Favorite Experiment

Stephen's favorite (and most hateful experiment) was a project he did in college. He did something you would usually do in graduate school. He helped design and build a house to run off solar power. It was his favorite because of the fun he had doing it: waking up every day and having to go and check it. He would check it and when he had finished he was very tired of it!

Childhood

When Stephen was a child, he liked technology and science.

These are some very powerful magnets.



Michelle Babione

WILDLIFE BIOLOGIST



What Is Wildlife Biology?

If you are studying biology, then you are studying living things, and you do most of your work in a lab. If you are studying wildlife biology, then you are most likely to be working with the animals in their natural habitat.

Childhood

As a child, Michelle hated science until college when she was given a science project. She discovered a completely new species of grass called *Spontana Altera Flora*, which stands up straight, and *Spontana Patens*, which lies flat on the ground. Because of this amazing discovery, she began her work with science. Her science work wasn't exciting at first; she was counting fish in a dark room under the fish ladder.

Background

- Education

Michelle went to Hampshire College, MA. She obtained a Bachelor's degree.

- Place of work

Michelle works at the Silvio O. Conte National Fish and Wildlife refuge located in Turners Falls, MA.

- Brief description of work.

Michelle works on helping re-arrange the environment for wild animals and relocating others to a better environment.



Her Responsibilities at Work

Michelle has two different jobs. She has to create new habitats for wild animals and to relocate wild animals to different habitats. She has prepared maps on the environment where she works.

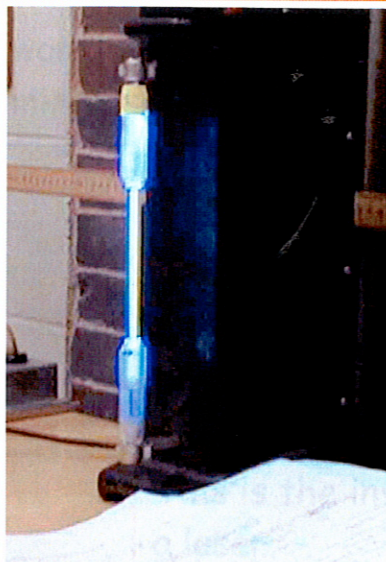
This map shows where Michelle works. She also created it.

Did You Know?

Did you know that woodcocks (a type of bird) live in large fields but because people would buy land for houses and for farms, they were forced to live in the forest. In the past, natural causes would create fields where they would live. When the animals were in their pre-evolved forms, giant beavers would walk around and knock over the trees.

Dr. Joyce Palmer Fortune

Physicist



The black box is a machine that sends electricity through a gas-filled tube. The electric current energizes the gas, which glows. When you look through a grating you see different colored light. That is called a light spectrum. You can identify different gases by their light spectra.

What is Physics?

Physics is the study of matter and energy. Some branches of physics study electricity, light, heat, magnetism, mechanics, and atoms.

Background

Education

High School

- Saint Agnes

College

- B.S. at University of Texas at Austin
- PhD and Master's at MIT

Place of work

- Smith College

Job Description

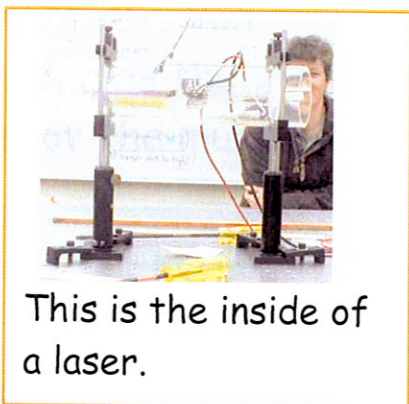
- Professor of Physics

Past job in science

- Worked in Japan researching semiconductors

Physics Lab classes

Dr. Fortune teaches her student's physics in a lab class. A lab class means most of the work they do is hands-on experiments. Some of the experiments they do work with heat, light, electricity, and magnetism. In one of the labs that works with light and electricity, the students build lasers. They have to align the mirrors with the glass tube. Once they do that they turn the power on and hope that the laser works. If it doesn't they have to realign the mirrors.



This is the inside of a laser.

Did you Know

Did you know how lasers work? I do. Lasers are not very complicated. Inside of a laser is a gas tube. When electricity passes through the gas tube it makes light. The light bounces off mirrors on the ends. Traveling back and forth, it aligns itself in a very straight path, and gets in phase. In phase means the light photons are grouped together on the same waves, not spread out. There is a tiny hole in one mirror. If one ray of light is aimed right, it goes out and becomes a laser beam, a beam of focused, in-phase light. That's how lasers work.

Work and Research

Currently Dr. Fortune doesn't have time to do research because she is so busy teaching. A typical day for her is: In the morning she reads and grades tests and quizzes. Once a week a professor from Smith gives a talk during lunchtime. In the afternoon her students come and she teaches them physics.



This is one of the computers they use in the lab.

Equipment

- Computers
- Lasers
- Lamps
- Gas Tubes
- Gratings
- Light spectrums
- Clamps

Richard Van Emmerik



Biomechanics

What is Biomechanics?

Biomechanics is the study of movement. Dr. Van Emmerik studies the movement of the muscles.

Childhood

Dr. van Emmerik was born in Holland. When he was about twelve he decided that he was interested in Physical Education, so when he grew up he decided to teach about movement and be a biomechanics scientist.

Background

- Education
- Jacoba Elementary School, Holland
- Sancta Maria High School, Holland
- Free University, Amsterdam
- PhD at the University of Illinois' U.S.A.
- Dissertation on hand movement
- Place of Work
- Totman building, Umass

Goals

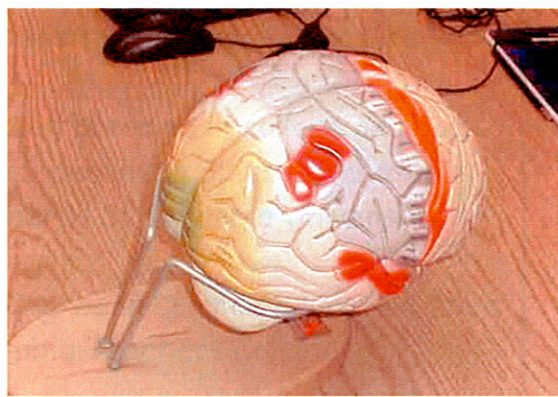
His goal is to help improve the understanding of Parkinson's disease.

Research and Work

Dr. Van Emmerik works on body movement. He works with people whose muscles have failed them and when they get better he helps them to learn to walk again. He also teaches UMASS students about body movement. He researches Parkinson's disease, and more body movement. Parkinson's disease is a disorder of the brain that reduces muscle control. Dr. Van Emmerik watches people walk and takes pictures of them to check their balance.

Do You Know?

Do you know that if you have Parkinson disease, you can have surgery to have cells removed from the brain and have new ones replaced to try to stop the shaking that is caused by the disease.



Equipment

- Cameras
- Video Cameras
- Computers
- Weight Devices

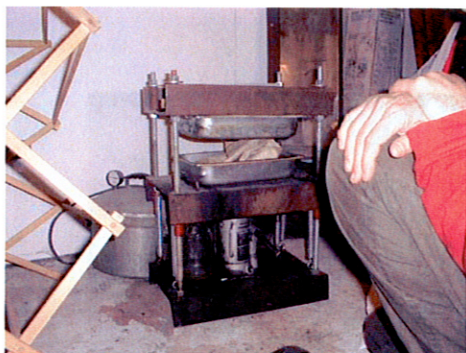
Chris Marano



Herbalist

What is Herbology?

Herbology is a study of plants and medicine to heal people and sometimes animals.



This is Chris's press.

Equipment

Chris has a press, a pan that has slots in it, that has powdered herbs in it, oven, sink, and measuring equipment a crock-pot, and a grill.

Background

- Chris is a clinical herbalist. He studied with the one of most famous herbalists in North America.
- Grew-up in a city, loved plants and liked to go into other people's yards to study at a little island of green.
- His next-door neighbor put on science shows and sent Chris on missions to find parts of nature
- Studied pre-med in college and got his BS degree in Chinese Philosophy and herbs at Columbia University.
- MA degree in science education from Columbia Teachers College.
- 20 years as a published writer.
- 20 years of study and teaching of ZEN meditation practice.
- 15 years study and practice of Cherokee medicine Tradition.
- Founder of CLEARPATH HERBALS, dedicated to teaching of herbal medicine, earth-based philosophy and the creation of high quality botanical medicines.

Research and Work

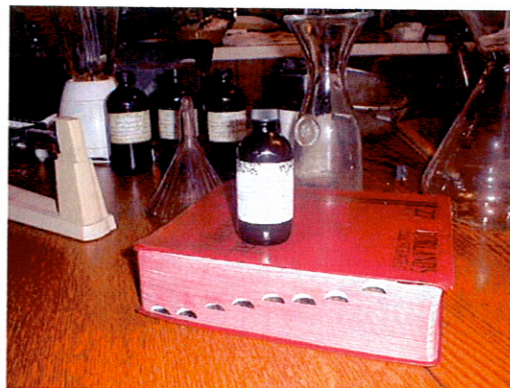
Chris works in his kitchen, greenhouse, and basement. Chris also travels around North America including Canada. He works with all different kinds of herbs from all over the world like China. He teaches kids and adults. He works with clients with herbal preparations to help with the illnesses. He researches some illness he does not know well.

Chris has so many jars around I can't count. He has a plant called Aloe Vera that he eats the inside of. Aloe Vera helps your skin. Another plant Chris has is called a Night Blooming Cereus. It is found in Florida. On one special night it sounds like "pop!!" and it will attract a particular kind of moth or bat. It depends on what kind of Night Blooming Cereus. They are extremely good for the heart.

Chris is not a typical scientist in a white lab coat but he uses scientific methods to understand how herbs work. He uses science to know which herbs to press to cook to take the oils from. He follows experimental technique and scientific method in his process.



This is Chris making the flu medicine.



The finished flu medicine.

Did you know?

That if you move a plant or an herb from a another place it would be better if you bring other plants or herbs that live around it because plants thrive in community.

Eric Dewar

Paleontologist



Background

Education

- Woburn public schools
- B.S. in biology and music at Tufts
- M.S. in geology at University of Colorado
- Working on Ph.D. at UMass

Place of work

- UMass Amherst

Job description

- Paleontologist

Past job in science

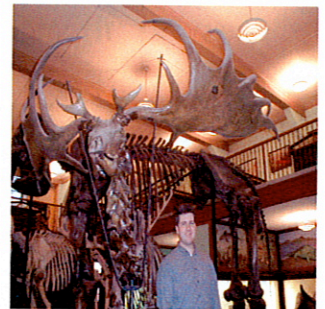
- Adjunct instructor
- Teaching assistant

What is paleontology?

It's a branch of biology that deals mainly with prehistoric animals and plants through fossils. Mr. Dewar's research is focused on prehistoric mammals.

Childhood

In his childhood he was very interested in dinosaurs and prehistoric animals. He was even reading the work of famous paleontologists such as Steven J. Gould at around the young age of 10.



Mr. Dewar with an Irish elk.

Work and Research

A main part of his work is called dental microwear; in this he takes the fossilized teeth of the prehistoric animal. Then, by closely studying the teeth with microscopes he can determine what the animal ate in the last two to three weeks of its life. For instance, if I ate a lot of corn it would erode my teeth in certain ways and he could see from studying my teeth that I ate corn. If he has enough samples he can compare them and make a good hypothesis on what the animal's main diet was.

A large prehistoric shell



Equipment

- Hand lens
- Microscopes in the lab
- Computers

A triceratops skull

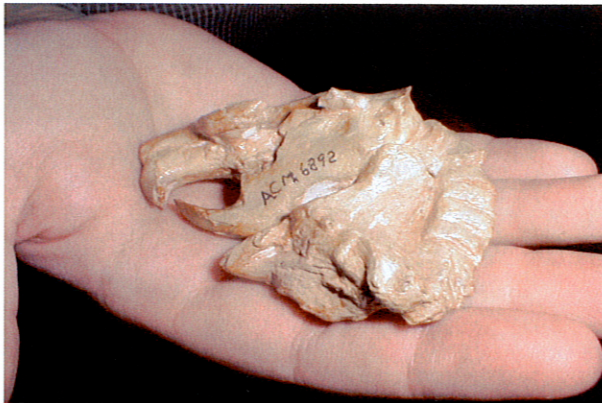


Thoughts About the field

Mr. Dewar disagrees with the theory that claims that dinosaurs were wiped out by an asteroid hitting earth. He argues that scientists focus too much on one place in Montana where the rock layer is from 65 million years ago. The scientists there use their findings to generalize about what happened in the rest of the world. He also says that an asteroid may have hit the world at that time but he doesn't see evidence to indicate it was the main factor in their extinction. He says there was a slow decline in dinosaur's diversity before that period and thinks that scientists should not use the evidence found in one part of the world to predict what happened in the rest of the world because after all, central Africa isn't exactly like Western Massachusetts. My interview with Mr. Dewar has changed me in that I now question the theory that dinosaurs were wiped out because of a large asteroid.

A lot of not very well-known paleontologists inspire Mr. Dewar. Steven J. Gould, is one of his favorite paleontologists.

This is a fossil rodent's head and spinal column.



There are hundreds of teeth that are kept in small cork vials and capsules at the Pratt Museum at Amherst College.



A woolly mammoth



Did you know?

- A famous paleontologist by the name of Al Romer lived in Pelham, Massachusetts.
- In the time of the dinosaurs, most mammals were the size of small rodents.
- The story of horse evolution is very famous and if interested you can look it up on the World Wide Web.