Maine Robotics Newsletter

September 16, 2015

Maine Robotics

Thoughts for September

Upcoming events:

- Introduction to LEGO Robotics Workshop
  - Falmouth September 25th
  - Rockland September 26th
  - Machias October 2nd
  - Bangor October 3rd
- FIRST LEGO League
  - Qualifiers November 21st
  - Kennebunk
  - Old Town
  - Jay
- FIRST LEGO League state championship December 12th at the Augusta Civic Center

Inside this issue:

Please share with your class and friends!

Things to think about: Lots of science news to discuss

Okay, it's been a really busy week in the news, with regard to science. And I wanted to talk about three stories , each for a reason.

Each story has the potential to make people upset, mostly because it is where science and previously held notions of "how things should be" collide.

People (capital P), meaning humankind as a huge group, generally like things to stay the same. Someone came up with an explanation for something and most people got behind it.

Yet if you understand the simple principle: "Everything changes and nothing stands still" then you will understand that while it is okay to cling to understanding; be prepared to change that understanding when new evidence is presented.

The concept of change being a constant is attributed to Heraclitus of Ephesus, a Greek philosopher who lived from 535 BC to 475 BC. Heraclitus is more often misquoted as having written: "The only constant is change", but the essence is the same.

We once thought the world was flat; that the sun revolved around the Earth; that people couldn't fly; and I'm sure if they thought about it, they would have said it was impossible to talk into a little object to someone on the other side of the world.

So everything that is "current" used to be impossible, and will likely get replaced as time passes. We can choose to cling or we can choose to embrace… but change will happen, it's the nature of the world.

Heraclitus[1]

Rising Star Cave

Okay, so everyone likes to dig in the dirt (don't they?).

If you've been watching the news or following the Rising Star Cave exploration on PBS, you know that starting in 2013, over 1,700 skeletal pieces have been removed.

The fabulous part is that these turned out to be from an unknown hominid species.

Hominids are the family of animals that includes the great apes and humans. This family includes 6 living (extant) and many extinct species.

This new discovery has lead to the classification of a new (extinct) species, *homo naledi.*

Many past discoveries of extinct species have relied on just a handful of fossilized bone fragments. But with *homo naledi*, they had most of a dozen skeletons to work with.

Continued, page 2.

Homo naledi mandible

Images:

1. Heraclitus: Npr.org 8/8/2011
2. Rising Star Expedition: http://voies.nationalgeographic.com/blog/rising-star-expedition/
3. National Geographic: attributed to Lee Berger.
4. University of the Witwatersrand, media release
5. Mohamed: WFAA, Channel 8, Dallas, TX
6. Cpl. Gunter: http://www.army.mil/women/profiles/current.html

Six women scientists go where no one else could go. And discover a new ancestor along the way!

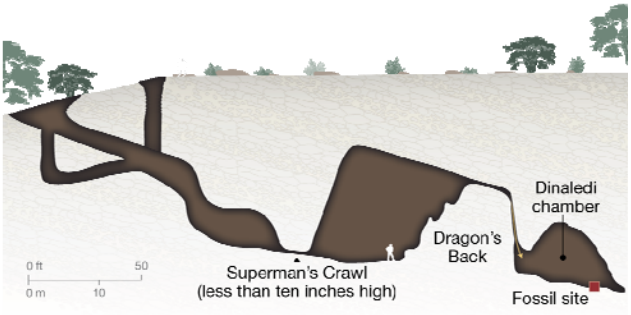
Rising Star Cave, cont.

There are so many cool things about the Rising Star Cave expedition. Where to begin?

The cave system is large and had been sealed off for ever (okay, maybe not forever, but long enough that the cave didn't have 2 million years of bones, dirt, and bat guano piled on top of the older material.

On the last day of an earlier expedition, two cavers went through a passageway that was extremely small (7.1 inches at its narrowest) and found the Star Chamber (naledi means star in the Sotho language). Several bones were collected but then the expedition was over. These bones were shared with Lee Berger who arranged for an expedition the following year.

But they needed paleontologists, archeologists, and they had to be SMALL. Remember, the passageway into this part of the cave was only 7" at its smallest. So a call was put out and 57 people applied to work deep underground in tight confined spaces. Six women were chosen for the job and they spent much of three weeks removing over 1,000 bone pieces.



Meet the Women Scientists from Rising Star Cave

So the call went out from Lee Berger: they needed scientists who were small enough to fit into the space, had the science background, and had spelunking or climbing experience.

Marina Elliot was doing her Ph.D. studies at Simon Frasier University, and is now doing her postdoctoral work at the University of the Witwatersrand in South Africa.

Becca Peixotto is working on her PhD at the American University.

K. Lindsay Hunter has a masters from the University of Iowa and has been doing field archeology work for years.

Elen Feuerriegel is a PhD candidate at the Australian National University, focusing on biomechanics, particularly looking at what would make a tool-maker, a tool-maker.

Hannah Morris, a new PhD student at the University of Georgia and Alia Gurtov doing her PhD research at the University of Wisconsin – Madison.

These were the six women who worked for weeks in two hour shifts, 90 feet underground, to excavate just the beginnings of another chapter in our history.

Irving Texas arrests a 14 year old engineer

So what do you do, when you do everything right and it all goes wrong?

Ahmed Mohamed, a 9th grade student in Irving Texas was excited. He had taken a bunch of electronic components, and did what geeks around the world love to do... built them into something new. In this case, he made a digital clock.

Because we all love to share our creations, he brought it to school so he could show his engineering teacher. Who told him not to show anyone.

But another teacher found out about it (alarm went off and he showed this teacher) and the next thing he knew he was pulled out of class, handcuffed, and taken to the police station.

Now imagine this happening to your budding engineer, computer programmer, or scientist.

What Ahmed did was exactly what we want our next generation of scientists and engineers to do. We want them to be creative and experiment. Like all of us, we want to share our excitement and get praised for that. (Cont.)

Irving Texas Clock, cont.

Did you know that there are more than 2,000,000 practicing engineers in the United States? There are also a similar number of computer programmers, database administrators, systems analysts and other IT professionals.

As a nation, we are just now starting to realize that these professions have been ignored in our formal educational system for too long. How can we bring along the next generation if we don't at least get these children exposed to the topics?

I am hopeful that Ahmed doesn't have the take away that engineering isn't for him, because he's already shown that he is exactly the kind of person who can and should be an engineer. Someone who identifies a problem (I want to build a clock) and then takes the steps to build it.

To predict that a clock would get him arrested would be a stretch for most of us. There was a time when students (and adults) had lots of do-it-yourself science projects, including making clocks and radios and computers, all from scratch.

It is always hard to second guess what others were thinking, but I find it disturbing that a young person shows great aptitude for a topic and it is totally misinterpreted by the school and the police.

"He just kept saying it was a clock" was the report from the police… what was he supposed to say if it was "just a clock"

We hope that all children who are using their brains and being creative in a positive manner are greeted with enthusiasm and encouragement, less we find ourselves without the thinkers of tomorrow.

The United States needs more engineers and programmers. And that starts in the elementary school, not in college.

Scientific studies: what it's all about

If you are going to go into science for a living, there are two really important fields that you'll have to get good at.

One is developing your study. In science, you identify a problem; propose a hypothesis; develop a study to test the hypothesis; and then do the study to try and determine if your hypothesis was accurate or not.

In science there are three base categories of results from a hypothesis.

- The result can support the hypothesis
- The result can refute the hypothesis
- The result can be inconclusive

People often mistake getting it "right" with good science. We all like to hypothesize something and have it proven right. But good science is still good if it proves it wrong.

The second area of study is statistics. It is statistics that will help you determine if the numbers you are getting (the results) are valid or not.

If you ask 5 people a yes or no question, do you have enough people to answer a research question? What about 50, or 500 or 5,000 people? Statistics helps with that question.

Building a scientific study: A case in point

Nothing gets folks dander up more than when the military is questioned, but it was in the news this week, so I'm going to chime in. Please don't take this as a pro or con military commentary, but a commentary on a poor science study.

A recent study released by the Marines Corp, showed that when comparing all male combat units to mixed (men and women) combat units, the all male units performed better in 69% of the tasks set for the evaluation.

But was it a fair study? Part of science is to eliminate ALL of the variables, except the one you are studying.

What was the variable being studied? Gender, male or female.

What other variables were NOT eliminated between the two groups being evaluated?

The males in both groups were made up on combat experienced soldiers while the females had passed combat training, but had no combat experience.

(cont.)

Cpl. Gunter, missiles

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What can you build?

Maine Robotics seeks to promote growth and interest in the sciences of engineering and computers; to provide opportunities to instruct teachers, coaches, and mentors in the skills necessary to in turn mentor and teach the youth of Maine. We also seek to provide a supportive system for children and youth to learn more about the STEM-C fields in an energetic and educational manner.

Maine Robotics offers the FIRST LEGO League Program, the Robot Track Meets, Workshops, and the ever growing Summer Academic Camp program. Each year we work with over 2000 children, youth, and adults.

We're on the web:

www.mainerobotics.org

A case in point (cont.)

Other problems with the study point to the basic problem of having a system specifically designed for your average male soldier. So all of the challenges and all of the equipment used are based on the average male soldier… but wait, the average female soldier is about 6" shorter and much lighter.

At their average height (5'4" women weigh about 125 pounds) compared to your average male (5'9.5" who would weigh in at 175 pounds).

Even when comparing the same height soldiers, the women tend to be about 20 pounds lighter. So carrying the same 60-130 pound load that a man would carry is NOT an apples to apples comparison.

Now ask a 5'4" 125 pound person to get a 50 pound pack over a wall designed to be extremely difficult for a 5'10" 175 pound person and you can start to see the issues.

If you spend decades and billions of dollars specifically gearing up for your average male soldier, wouldn't it be appropriate to do the same for maximizing efficiency of your average female soldier.

Please, again, take this as a critique of the flawed study, not on the military or having women in combat roles.

I've been doing science my whole life and it is difficult when I come across a study that misses the basic necessity of eliminating unnecessary variables.

And remember, when faced with a fence in the middle of a field, who says you have to go over it? You can go around it, under it, or even through it.

Assuming there is only one way to solve a problem misses all of the other options available to you.

How will you get across?