Newsletter

College of Physical and Mathematical Sciences

Flesh-Eating Insect Gnawed on Dino Bones

New findings explain why most dinosaur skeletons exhibit pits, grooves, furrows and even entire gnawed-off sections: Flesh- and bone-eating insects were the culprits.

The evidence comes from dinosaur bones that were buried under soft mud 148 million years ago after a nearby river overflowed. Utah's Western Paleontological Laboratories recovered the bones and turned them over to Brigham Young University scientists, who recently pieced together what happened.

Precise recreations of dinosaur-era events are rare, but the scientists now know the following: A Camptosaurus adolescent dinosaur died in what is now Wyoming, lying down for its final rest. Flying low over a floodplain a few days later, dermestid beetles used their antennae to detect the odor of the decaying carcass, where they laid their larvae that consumed the dinosaur's bones.

"Bone consumption by dermestids is a last resort," said Brooks Britt, lead author of a remarkably vivid report about the dinosaur bones published today in the journal *Ichnos*. "They prefer juicy tissues." "However, larvae, lacking wings, cannot fly off to another carcass when soft tissues becomes scarce," added Britt, assistant professor of geology at BYU. "In order to become large enough to pupate and therefore survive to the adult stage, the larvae will resort to consuming the soft, greasy ends of bones and the marrow-filled interiors."

He and colleagues Rodney Scheetz and Anne Dangerfield began their investigation after first noticing that tiny teeth marks accompanied the missing parts of their Camptosaurus skeleton. Meaning bent lizard, due to its hunched over appearance, Camptosaurus was a beaked, early Jurassic plant-eater.

The teeth marks on its bones showed that the gnawers were very small and possessed two pointy teeth set on symmetrical jaws. The scientists first tried to match this pattern with an extremely tiny mammal from the period, the Fruitafossor, but its skull and body diameter were still too large.

The researchers then narrowed down the suspects to four groups of insects known to eat bone. These include mayflies, moths, beetles and termites.

"Although it is not commonly known, termites can consume bone, both fresh and weathered, and can completely consume a human skeleton," the team wrote. Only dermestid beetles, which are still in existence today, matched the dinosaur bone marks, which Britt molded using materials obtained from his dentist, and then viewed under an electron microscope.

-Jennifer Viegas, Discovery News

College Interdisciplinary
Research Luncheon
Noon, Tuesday, 17 June 2008
N-181 ESC
Please RSVP attendance to
Lynn Patten,
lynn_patten@byu.edu
(Limited seating available)

BYU professor's Web site receives international honor

Brigham Young University chemistry professor Brian Woodfield has been selected to receive a 2008 Pirelli "International" Award, the world's first Internet multimedia award aimed at the diffusion of scientific and technological culture worldwide.

Awards are granted every calendar year to the best multimedia presentations oriented toward physics, chemistry, mathematics, life sciences and science communication conducted on emerging online communication platforms that go beyond a simple Web site. The overall budget for the prize is €115,000, or about $178,000.

Woodfield won the award for his innovative online laboratory, Virtual ChemLab. He came up with the concept as a graduate student at the University of California, Berkeley, and used grants from BYU and the Department of Education to fund the project.

Virtual ChemLab contains all the amenities of a real laboratory setting, including limitless supplies of expensive or hazardous substances to which students usually have infrequent access. With the click of a mouse, students can set up, conduct simulations and view the outcome of each chemical combination or experiment.

The simulations, which Woodfield says have increased student performance in BYU organic chemistry labs by 30 percent, have also been implemented in more than 20 colleges and universities in the United States and Canada.

Department of Statistics Hosts

Summer Institute of Applied Statistics

The 33rd Annual Summer Institute of Applied Statistics will be held June 18-20, 2008 and will be presented by Dr. Scott M. Berry of Berry Consultants. The title of his seminar is "Bayesian Clinical Trials." The course will describe recent Bayesian innovations in the design and analysis of clinical trials. Additional details and registration information can be found at

http://statistics.byu.edu/summer_institute/

Dr. Sean Warnick Awarded Prestigious Visiting Professor Position with the NSA

Dr. Sean Warnick, (shown to the right with student Nghia Tran) Assistant Professor in the Computer Science Department at Brigham Young University, was selected as the 2008 Distinguished Visiting Professor (DVP) by the National Security Agency (NSA) this week. The position, administered by the NSA Enterprise Operations Research, Modeling, and Simulation (OR/M&S) Group, is highly competitive and is offered to a professor with a distinguished record in both decision science applications and student mentoring.

"We first heard of Dr. Warnick's work from a colleague at MITRE Corporation who tipped us off to BYU and what they are doing there with student mentoring," said Francine Goode, Director of the Summer Program for Operations Research Technology (SPORT). "Visiting Warnick's research group, the Information and Decision Algorithms Laboratories (IDeA Labs) last fall, I could tell it is an amazing environment where students from various disciplines come together to work on decision problems arising in a variety of areas, from microbiology to economics."

Warnick received his Ph.D. from MIT in 2003 in Electrical Engineering and Computer Science, with a minor in Mathematics. His work focuses on the feedback control of complex dynamical systems, with applications including proteomic network reconstruction, scheduling of batch manufacturing systems, and market power / valuation analyses in merger-and-acquisition studies. Warnick was a visiting scholar in the Control Systems Group at Cambridge University during the summer of 2006, and he is a founding director of IDeA Labs at BYU.

"I was quite surprised to get a call from the government last summer saying that they have reviewed my work and would like me to apply for this program," Warnick said. "Apparently it's not just an ordinary summer position, but an opportunity to work on a wide range of important projects with a diverse set of NSA customers via the SPORT program. I am eager to spearhead a strong relationship between our students at BYU and the DoD."

The SPORT program is a highly competitive graduate-level intern program that brings top students from around the country into the Department of Defense to work on key national security issues. Only about 3-4% of the applicants are admitted, and only top graduate students from rigorous programs such as Operations Research, Computer Science, Mathematics, Engineering, or Statistics are considered. During the program, the students create mathematical models, conduct decision analysis, and employ sophisticated simulations on some of the most state-of-the-art computing facilities in the world.

"The DVP acts as a mentor to students and also a liaison between the students and the OR/M&S customers," explained Goode. "It is important that we connect to the best emerging talent when solving critical problems. To help us with that, we conduct a national search and select a unique individual as DVP who not only understands the technical nature of the problems we are working on, but also has the ability to connect with students and bring out the best they have to offer. This year, we are excited to name Dr. Warnick as our DVP for 2008."

Computer Science Student Awarded Prestigious Microsoft Scholarship

Sambridi Gautam, a sophomore in computer science, has been selected as a Microsoft Scholar. Each year, Microsoft awards the scholarship to a select few of the best and brightest computer science students from the United States, Mexico, and Canada. This prestigious award covers all tuition costs for an entire year.

Sambridi, originally from Kathmandu, Nepal, transferred to BYU after a semester at Southern Arkansas University. As a new BYU student, she was considering physics or astronomy. However, she took CS 142 her first semester and became interested in computer science. Within the field of computer science, Sambridi's interests lie in the areas of software engineering and computer graphics.

Sambridi enjoys the fact that her computer science degree will allow her to enter nearly any field she chooses. The computer science field, she has found, is not limited to a certain area as computers and technology are required in all industries, a fact which will open many doors for her upon graduation.

2008 Annual Meeting of the National Council of Teachers of

Dr. Steven R. Williams recently gave the opening address at the Research Pre-session of the 2008 Annual Meeting of the National Council of Teachers of Mathematics (NCTM). More than five hundred mathematics education researchers and mathematics teachers from all around the world attended his presentation. Dr. Williams was selected for this honor because of his recently completed four-year term as editor of NCTM's research journal, *Journal for Research in Mathematics Education*. This journal is commonly recognized as one of the premier international research journals in the field of mathematics education.

In his address, Dr. Williams questioned the assumption that there is a single, universal mathematics that is practiced more or less correctly by the many different groups of people who use mathematics in their professions or everyday lives. Citing research on mathematical knowledge, mathematical discourse, and mathematics teacher education, Dr. Williams argued that the existence of a single, universal mathematics has yet to be established. In fact, it is more likely that there are multiple mathematics that are characterized by unique mathematical practices, norms, and discourse patterns. He urged researchers to use the tools of ethnography and discourse analysis to study different mathematical communities and characterize their mathematical practices and discourses. Findings from these studies can be used to guide mathematics educators in making decisions about what content to teach in the public schools.

College Publications

Chemistry & Biochemistry

Swenson, D. M.; Blodgett, M. B.; Ziemer, S. P.; Woolley, E. M. Apparent molar volumes and apparent molar heat capacities of aqueous tetrahydrofuran, dimethyl sulfoxide, 1,4-dioxane, and 1,2-dimethoxyethane at temperatures from 278.15 K to 393.15 K and at the pressure 0.35 MPa. *Journal of Chemical Thermodynamics*. 2008, 248-259.

Swenson, D. M.; Woolley, E. M. Apparent molar volumes and apparent molar heat capacities of aqueous KI, HIO_3, $NaIO_3$, and KIO_3, at temperatures from 278.15 K to 393.15 K and at the pressure 0.35 MPa. *Journal of Chemical Thermodynamics*. 2008. 54-66.

Computer Science

Geological Sciences

Mathematics

Mathematics Education

Physics and Astronomy

B. J. Taylor, M. D. Joner and E. J. Jeffery, "Cousins Photometry and Temperatures for the Hyades, Coma, NGC 752, Praesepe, and M67", (2008) Astrophysical Journal Supplements, Vol. 176, P. 262, May, 2008.

Keivan Esfarjani and Harold T. Stokes, "Method to extract anharmonic force constants from first principles calculations", The American Physical Society, Physical Review B 77, 144112-1-144112-7 (2008).

Statistics

Lawson, J.S., "SAS Macros for Analysis of Unreplicated 2^k and 2^{k-p} Designs with a Possible Outlier," *Journal of Statistical Software,* **25** *(13), 2008.*