Department News

Search Narrows for Botany Professor
January 12 was the deadline for applications for the Biology Department vacancy created when Dr. Steve Stein resigned last year. Sixty applicants applied for the tenure-track position specializing in plant ecology or plant evolutionary biology. Three candidates are scheduled for interviews in March.

Approval to Hire A/P Faculty
The department was given approval to hire two Anatomy/Physiology faculty for Fall 2004 – one Lecturer and one Assistant Professor. Applications are currently being reviewed. The addition of these two positions helps cover the demand for our 200-level Anatomy/Physiology courses.

Amgen Corp. Donation
Recently Amgen Corporation made a generous donation of equipment and supplies to the Biotechnology program. Included were a Kodak Photo Documentation System, Kodak Carousel projector and cases, liquid chromatography columns and supplies, and protein purification supplies. The program and students benefit from having up-to-date equipment. Thanks, Amgen!

Web Site Honors
Charles Herr's Genetics web site (at http://www.biology.ewu.edu/aHerr/Genetics/Bio310/index.html) is consistently ranked one of the most popular in several search engines for Biology>Genetics>Education sites. The technology-oriented EWU Associate Professor of Biology is also continuing development of his virtual professor, a 3D animated character that will provide students with a unique educational approach to Genetics and Cellular Biology.

Study Seeks Link Between Dinosaur and Bird Breathing Mechanisms
For ten years, EWU biology professor Dr. Dona Boggs has researched the interactions between movement and breathing in birds, focusing on how movement impacts air movements in the respiratory system. A planning grant from the International Cooperative Science program at NSF took her to New Zealand in February to continue these studies and expand them to reptiles and theories about how some dinosaurs may have breathed. Collaborations on this project will include biologists from Germany, Australia, New Zealand and Utah.

Unlike human beings, whose entire lung changes volume during breathing, birds experience an expansion in air sac volume during respiration. The volume changes in air sacs drive the flow of air through a fixed volume lung. When a bird is flying, the air sacs expand on the upstroke of the wings and are compressed on the down-stroke, hence birds tend to coordinate breathing and wing beat cycles to minimize interference and maximize assistance to breathing from locomotion. In some lizards the side to side bending of the body with locomotion compresses the lung on one side of the body while expanding it on the other. Boggs’ work investigates the interactions and co-evolution (continued on page 2)

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Dinosaur-Bird (cont. from page 1)

of respiratory and locomotor mechanisms in land vertebrates (also known as tetrapods).

Primitive reptiles had projections on their ribs called uncinate processes and rib-like structures along the abdomen called gastralia. The only remaining reptile with both of these structures is the tuatara, unique to islands off the coast of New Zealand. The group of dinosaurs (therapsids) postulated to share a common ancestor with modern birds also had gastralia and uncinates. Crocodiles and alligators retain gastralia and only small cartilaginous remnants of uncinates, and birds retain often robust bony uncinate processes. The function of these structures has been speculated upon but without measurements of the activity patterns of associated muscles both at rest and during exercise. Boggs and her collaborators will make such measurements to clarify the role of those structures in breathing or locomotion or both in birds and tuatara. This information may be useful in clarifying the role of those structures in the theropod dinosaurs and contribute to the debate about whether such dinosaurs had respiratory systems like modern birds or mammals or crocodiles. The nature of the respiratory system of dinosaurs may also be related to the beginning of endothermy – the internal maintenance of body temperature – and thus the ongoing-debate about whether some dinosaurs may have been ‘warm-blooded.’ This theory contradicts the previously-held notion that dinosaurs had to bask in the sun like modern reptiles to maintain their temperature. Furthermore, like modern birds, dinosaurs may have possessed feather-like structures to retain body heat.

To learn more about the function of uncinate processes and gastralia in tuataras, researchers must travel to Victoria University in New Zealand to study a captive colony. Before the research team can study the tuataras, or any other species indigenous to New Zealand, however, they must obtain permission from the native Maori people. The Maori are understandably protective of the land, wildlife, and resources, and want to ensure that the tuataras will be unharmed during the research.

Cooperation between cultures will not only aid in the preservation of the tuatara species, but can possibly provide more information about the breathing mechanisms of modern and extinct creatures. Moreover, this breathing study is an important step in understanding how adaptations allow animals to survive in various environments, and in beginning to understand the mysterious connection between birds, reptiles, and dinosaurs. In the future, Dr. Boggs hopes to continue her research with the permission of the Maori and support of the New Zealand government. She would like to travel to New Zealand again to continue her study on tuataras, as well as on flying, diving, and flightless birds. Boggs will attempt to discover the functions of uncinates and gastralia in living animals; what they may have been for in extinct dinosaurs; and how animals evolved breathing and locomotor mechanisms from structures originally involved in locomotion before the migration of vertebrates onto land, and in such a way as to minimize conflicts between the two processes of moving and breathing.

Thanks to Jessilyn Matthias for contributions to this article.
Prescribed Burning Beneficial to Forest Growth
by Jessilyn Matthias

Cassie Hebel is a 5th year student at Eastern Washington University majoring in general biology. In June of 2002 Cassie became a McNair Scholar, an honor given to select undergraduate students to gain research experience for pursuit of an advanced degree. This is Cassie’s second year working on her independent study project with the help of the McNair scholars.

Last summer Hebel worked on a project at Turnbull National Wildlife Refuge and will continue the project Summer 2004. Her research focuses on the effects of prescribed burning on ectomycorrhizal fungal communities, using Turnbull as an experimental example. Ectomycorrhizal fungi develop a symbiotic relationship with some types of plants; the fungi aid the mineral and water absorption of the plants’ roots, and the plants provide a carbohydrate nutrient source for the fungi. Cassie planned her studies based on personal interests and received guidance from EWU Biology professors Dr. Margaret O’Connell, Dr. Suzanne Schwab, and, most recently, Dr. Prakash Bhuta.

For the past two years, Cassie has analyzed the ectomycorrhizal fungal communities of burned areas at Turnbull to see which species of fungi re-colonized first after the forest regenerated. Contrary to popular belief, low intensity fires are beneficial to forest growth. The supervisors at Turnbull prescribe low-intensity fires to clear out dry and dead underbrush and create more room for healthy trees to grow. High intensity fires, on the other hand, are fires that burn healthy, living trees and destroy large areas of habitat. Turnbull tries to prevent these damaging fires because they harm numerous animal and plant species.

During her research last year, Hebel conducted a small-mammal survey of the burned areas using the presence of fungal spores found in the animals’ fecal matter. Cassie tried to identify the fungal species using microscopy, but found it difficult. To solve this problem, Hebel is currently working with Dr. Bhuta to identify fungi species using equipment that studies molecular DNA. The organism’s DNA will tell Cassie specifically what type of fungus is present in burned versus unburned habitats. Hebel’s work provides insight into how a forest regenerates after burning and the effects on its wildlife. Moreover, it reveals the biological interactions of organisms that may be affected by prescribed burning.

Cassie has presented her research at numerous venues, including the EWU Student Research and Creative Works Symposium and the Washington Native Plant Society annual meeting. She will graduate winter quarter 2004 and is in the process of applying to graduate schools. Being a McNair Scholar has allowed Hebel to gain graduate-level research experience as well as having the opportunity to work with many experts in her field of study.

Cassie has always been interested in ecology and animal studies. Her research at Turnbull provides an opportunity to study a subject she thoroughly enjoys, making it fun and exciting work. In the future, Cassie wants to study similar research areas and publish the research findings from her work at Turnbull.

ALUMNI UPDATE

Chris Valley (BS, 1999, Human Biology) is in his 4th and final year at the National College of Naturopathic Medicine (NCNM) in Portland, Oregon. He will graduate as a doctor of naturopathic medicine (ND) – physicians who treat patients from a holistic point of view. Chris says he became disenchanted with today’s medical system after working in a major medical center for 8 years. NDs spend an average of 45 minutes with each patient compared to 10 minutes for a MD. Chris is married to EWU Biology Department alum, Tanya (Druffel) Valley.

Roger Williams (MS, 1981) got his Ph.D. in Biochemistry from the University of California at Riverside. He did postdoctoral studies in the Department of Theoretical Physics at the Boris Kidric Institute in Yugoslavia (1 year), the Department of Chemistry at Cornell University (3 years), and the Center for Advanced Research and Medicine at Rutgers University (3 years). Since 1993, Roger has led a group in X-ray crystallography at the Medical Research Council’s Laboratory of Molecular Biology in Cambridge, England.
Local Organizations Support Students

Cheney Recycling Center Award
Brittany Davidson, a Biology major with concentration in Environmental Biology, was recently awarded a Cheney Recycling Center Scholarship for the 2003-2004 academic year. Congratulations, Brittany!

Hollister-Stier Textbook Awards
Hollister-Stier Laboratories has provided funds for the EWU Biology Department to assist students with purchasing textbooks on a quarterly basis. Textbook awards went to the following students during the last two quarters:
- Christopher Kirkpatrick
- Heidi S. Michael
- Sara Miller
- Tim Ochoa
- Morah Peltonen
- Emmanuel Udasco

Thank you to Cheney Recycling Center and Hollister-Stier Laboratories. Our students definitely benefit from your generosity.

Contact Us

Biology News is a quarterly publication of the Eastern Washington University Department of Biology. To contribute items of interest – news, features, alumni updates – please contact:

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