



the *EEl*

edited by Massimo Pigliucci

PUBLISH OR PERISH, A BRIEF LOOK AT SOME RECENT PUBLICATIONS BY E&E FACULTY AND STUDENTS (BY FAR NOT A COMPLETE LIST!)

CORRELATED EVOLUTION AND DIETARY CHANGE IN FOSSIL STICKLEBACK

By MA Purnell, MA Bell, DC Baines, PJB Hart, MP Travis. *Science* 317:1817, 2007. Where Mike and collaborators show that there was a diet shift in a species before it went extinct and was replaced by another species that initially ate the same diet (benthos) but shifted back to plankton over thousands of years.

PRIORITIZED PHENOTYPIC RESPONSES TO COMBINED PREDATORS IN A MARINE SNAIL

By P.E. Bordeau. *Ecology* in press. Pau investigated the separate and combined effects of the presence of shell-breaking and shell-entry predators fed conspecific snails on the defensive shell morphology and antipredator behavior of a marine snail. >>

PREDICTING EXTINCTION RISKS UNDER CLIMATE CHANGE

By DA Keith, HR Akçakaya, W Thuiller, GF Midgley, RG Pearson, SJ Phillips, HM Regan, MB Araújo, TG Rebelo. *Biology Letters* 4:560–563, 2008. In which Resit and collaborators find that that complex interactions between life history, disturbance regime and distribution pattern mediate species extinction risks under climate change..

**[MORE “PUBLISH OR
PERISH” ON LAST PAGE]**

The View From the Chair



As you can see from this edition of the *EEl*, the department has been very active in all sorts of areas during the past few months. Six students earned Ph.D. degrees this past spring and summer (see “Recently Graduates”). We are proud of all of them and wish them well in their new positions.

We received two very generous endowments this past Spring, one from Lev Ginzburg and one from Douglas Futuyma, to each fund one departmental colloquium speaker each year in perpetuity. The department and graduate program are very grateful for these gifts, which will enable us to bring in outstanding speakers every year in the areas of evolutionary biology and ecological theory.

Our newest faculty member will be Professor Jukka Jernvall, who will be joining us in Spring 2009 and after that every year in Spring semesters. Jukka is presently at the University of Helsinki, and he will continue as a researcher and faculty member there, and reside in Finland in Fall semesters. His research is in the area of evolutionary developmental biology. He has investigated how and why development and environment shape species diversity. Much of his research relates specifically to mammalian dentition, working with a range of organisms from mice to lemurs. His approach includes experimental work in the lab, analysis

of the fossil record, and study of animals living in the wild, with a focus on development, function, and evolutionary history. Dr. Jernvall earned his Ph.D. from the University of Helsinki in 1995 and has been a faculty member there since that time.

Our “first year” faculty members, Joshua Rest, Liliana Davalos, and Resit Akçakaya, have been settling in, establishing labs, and getting to know the faculty and graduate students in the department, and we have all been enjoying getting to know them as well.

The University as a whole has been strongly affected this summer and fall by one major budget cut after the next, as New York State has been strongly impacted by the current financial crisis. New York’s budget is closely linked with the fate of Wall Street, and we have felt that during the economic meltdown in recent months. The department had been approved for two faculty hires to replace faculty members who have left the university, and, in addition, we were promised another faculty line as part of our commitment to the proposed new Human Evolution major. To our deep disappointment, all hiring at the University has been frozen, including these positions. It seems unlikely that we will be able to recruit anyone this year, as far as I can guess. The cuts are also affecting other aspects of the University’s and Department’s ability to function, not surprisingly. On the bright side, we have been allocated some funding to

WORTH A THOUSAND WORDS:

Evolution of fossil sticklebacks reflects effects of genes and natural selection, say Michael Bell and Matthew Travis. Using a 17,000-year fossil sequence, they traced evolution of the stickleback pelvis from a large complex bone with sharp spines to a tiny button of bone. Pelvic girdle reduction is caused mostly by a gene called *Pitx1*, which also causes the pelvic vestige to be larger on the left side than the right. The extreme reduced variant of the *Pitx1* gene apparently was not available when natural selection began to whittle away at the fossil stickleback's skeleton. "My introductory geology professor was right – the present really is the key to the past," commented Bell.

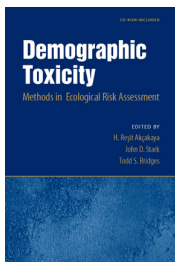


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renovate and redesign the first floor space now used for graduate and postdoc offices, so that we can have decent new faculty offices with space for postdocs and/or graduate students as well. We're hoping that construction will begin this winter and that we'll be able to move people into that renovated space next Spring semester. Other plans for upgrading and renovating the sixth floor have been put on hold for now; we're definitely the Third World of the Life Sciences building. However, the roof patches seem to be holding and we no longer get wet every time it rains!

We are beginning to gear up for hosting what promises to be an exciting symposium in celebration of the 150th anniversary of the publication of the Origin of Species. Our celebration of Darwin 2009 in November 2009, spear-headed by Massimo Pigliucci with the help of Doug Futuyma, Walt Eanes and Jeff Levinton, will be one of the outstanding events for a year of celebrations worldwide.

Books-by-US: Resit's Demographic Toxicity



Edited By:
H. Resit Akçakaya,
John D. Stark and
Todd S. Bridges
Oxford University
Press (2008).
Demographic
toxicity is the

ecological impact of a pollutant or toxicant on the population(s) of a plant or animal species. Such toxicity is measured in terms of population-level endpoints, such as risk of decline and population growth rate, rather than individual-level endpoints. In recent years, use of these methods has become increasingly popular in gauging the ecological consequences of various chemicals. Yet despite a growing emphasis on the study of living populations, there exist relatively few case studies or applications of models for such assessments, leaving less experienced researchers with no real guidelines with which to develop their own models.

This contributed volume offers population and metapopulation models for a wide variety of species, focusing on the use of models to evaluate the risks faced by these species due to a variety of toxicants. Each chapter describes the application of a population model to one species, with the aim of demonstrating how various life history characteristics of that species are incorporated, how ecotoxicological impacts are modeled, and how the results have been or can be used in risk assessment. The accompanying CD-ROM includes data files for each species modeled in the book, along with a demo version of the RAMAS software used to create the models.

New Faculty Profile: Liliana Dávalos



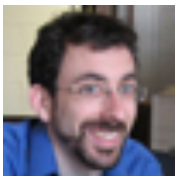
Liliana is an evolutionary biologist interested in the role of environmental change in the history and future of

biodiversity. Her thesis research at Columbia University and the American Museum of Natural History investigated the evolutionary history of the Antillean bat community, finding that endemic lineages were much older than previously thought, and that low sea level stands have allowed populations to colonize the islands and their descendants to back-colonize the continental Neotropics. Her postdoctoral research at the University of Arizona and later at the Sackler Institute of Comparative Genomics focused on applying comparative methods to understanding the evolution of genomes.

Liliana is currently interested in integrating genetics- and environment-based approaches to reconstruct the demography of endemic species, and model future population trends under alternative climate change scenarios. She is also conducting research on the links between illegal drugs, land use change, and the conservation of

threatened species. These projects require close collaboration across disciplines, which made her hire through Stony Brook's new Consortium for Inter-Disciplinary Environmental Research (CIDER) particularly attractive. Liliana is excited to join SBU and the Ecology and Evolution Department, and looks forward to fruitful collaborations with the faculty and students.

New Faculty Profile: Joshua Rest



Joshua studies evolutionary genomics. He received his PhD in 2004 from the University of

Michigan, and did his postdoctoral research at the University of Chicago. He has participated in an eclectic mix of phylogenetic studies, with subjects including the timing of diversification of birds and land plants, and the identity and selective forces acting on protein families including small heat shock, sex determining and reverse transcriptase proteins. Currently, Joshua studies the evolutionary forces that have shaped genomes. One ongoing project examines variation in transcription factor binding sites and RNA transcript lengths, in order to assess their contribution to the evolution of gene regulation. Another project investigates whether the survival of young duplicate genes is facilitated by changes in gene expression and protein localization of the paralogs. Joshua uses computational analysis to generate predictions from comparative protein-DNA, protein-protein and gene expression data sets. He validates such predictions experimentally by making genetic changes to yeast and assessing the fitness of these mutant strains. Joshua is

already enjoying the knowledge and experience of colleagues, collaborators, and grad students in the department and at Stony Brook, and looks forward to the continued growth of evolutionary genomics on campus.

Darwin Day '09: Steve Stearns



The 2009 Darwin Day speaker at Stony Brook will be Steve Stearns, from Yale University. Steve specializes in life history

evolution, which links the fields of ecology and evolutionary biology, in evolutionary medicine, and in evolutionary functional genomics. He moved to Yale in 2000 from the University of Basel, Switzerland, where he had been professor of zoology since 1983.

His books include "Evolution, an introduction" (Oxford, 2000) with Rolf Hockstra, "Watching, from the Edge of Extinction" (Yale, 1999) with his wife Beverly Peterson Stearns, "The Evolution of Life Histories" (Oxford, 1992), and two edited volumes, "Evolution in health and disease" (Oxford, 1998) and "The Evolution of Sex and its Consequences."

A 1967 graduate of Yale College, Steve earned a M.S. from the University of Wisconsin and a Ph.D. from the University of British Columbia. He founded and has served as president of both the European Society for Evolutionary Biology and the Tropical Biology Association and was founding editor of the Journal of Evolutionary Biology. He has been a vice president of the Society for the Study of Evolution and is a fellow of the American Association for the Advancement of

Science. His Darwin Day talk will be at the SEC Auditorium on Friday, February 13, 2009 at 7pm.

Recently Graduated

Josh Banta on tolerance to herbivory in *Arabidopsis thaliana*

Tolerance of damage to reproductive tissues is a form of plant defense against herbivory. Josh examined the ecology of tolerance to apical meristem damage in natural strains of *Arabidopsis thaliana* originating from three different areas of Europe, using high and low soil nutrient levels, to understand if tolerance is contingent on soil nutrients and if the response is similar species-wide. He found that there was no species-wide relationship between tolerance and nutrients in natural populations of *A. thaliana*, which has important implications for theoretical modeling of tolerance. Josh also used oligonucleotide microarrays to pinpoint genes involved in the response to damage to identify genes whose expression levels were significantly altered by it. He identified 58 genes involved in the response to damage that can be targeted in follow-up studies to verify their roles in tolerance. Josh graduated with Massimo Pigliucci and is currently a postdoc in Michael Purugganan's lab at New York University.

Roman Yukilevich models sexual isolation and admixture in *Drosophila*

Understanding the beginning stages of speciation is of central importance in evolutionary biology. Roman focused on the evolution of sexual isolation, which is one of the key mechanisms of speciation in nature. Specifically, he studied natural populations of *Drosophila melanogaster* in United States, Caribbean islands and Africa. The *D. melanogaster* African

populations are ancestral and exhibit incipient sexual isolation from more temperate populations outside of Africa. Roman's results show that Caribbean populations segregate many African traits and exhibit partial sexual isolation from some temperate US populations. Caribbean genomes, despite sharing many sites in common with US populations, have also many important African genomic regions, which suggests that Caribbean flies are admixed populations between US and African flies and retain their African traits associated with sexual isolation despite gene flow from US. It appears that a widespread and human commensal species may spread alleles for sexual isolation throughout the species range fairly rapidly. Roman graduated with John True and is now a postdoc in Chung-I Wu's Lab at the University of Chicago.

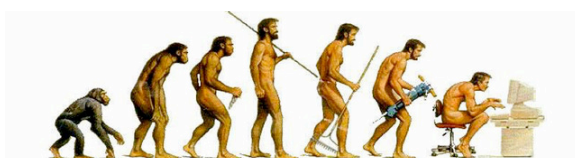
Toni Lyn Morelli studies the dispersal, kinship, and genetic structure of an endangered Madagascar primate

Toni studied the factors that determine grouping in sifakas. *Propithecus edwardsi* live in groups of 2-9 individuals including one breeding male and one to two related breeding females. Using the theories of kin selection, ecological constraints, and reproductive skew, she examined the effects of relatedness, environment, and mate availability on cooperation, group composition, and reproduction. Results showed that one factor predicted the majority of dispersal events: presence of an available unrelated opposite sex adult (a "mate"). Most unpredicted dispersal events were the result of aggressive takeovers by immigrant same-sex adults. Toni also used

population genetics tools to examine the movement of individuals, focusing on groups found on either side of natural and man-made barriers. Sifakas are genetically diverse, however, gene flow may be disrupted by a barrier in the future, with potential management and conservation implications. Toni graduated with Pat Wright.

Sue Natali on the effects of elevated carbon dioxide on trace metal cycling in forests

Changes in plant growth and function associated with increased atmospheric carbon dioxide can affect element cycling and ecosystem processes. Sue's dissertation examines CO₂ effects on trace metals in plants and soils because of the massive impact plant processes have on metal cycling and the importance of metals as both contaminants and micronutrients. Sue examined CO₂ effects on a suite of metal micronutrients and contaminants in forest trees and soils at two free-air CO₂ enrichment sites and an open-top chamber experiment in a scrub oak community in Florida. She found that CO₂-mediated changes in soil properties affected the storage of metals in soils. There was a general decline in foliar metal concentrations with CO₂ enrichment; however, CO₂ effects on foliar metals were species and element specific. Her dissertation demonstrates that increased atmospheric CO₂ has the potential to affect the biological cycling, storage, and stoichiometry of trace metals in terrestrial systems. Sue graduated with Manuel Lerdau and is currently a postdoc in Ted Schuur's lab at the University of Florida.



MORE PUBS!

IS EVOLVABILITY EVOLVABLE?

By M Pigliucci. *Nature Genetics Reviews* 9:75-82, 2008. Massimo takes on the ever elusive concept of evolvability and tries to make sense of it.

INCIPIENT SEXUAL ISOLATION AMONG COSMOPOLITAN DROSOPHILA MELANOGASTER POPULATIONS

By R Yukilevich, JR True. *Evolution* 62:2112-2121, 2008. Roman and John suggest that widespread and human-commensal species may harbor different types of mating preferences across their geographical ranges.

AN AMINO ACID POLYMORPHISM IN THE COUCH POTATO GENE FORMS THE BASIS FOR CLIMATIC ADAPTATION IN D. MELANOGASTER

By PS Schmidt, C-T Zhu, J Das, M Batavia, L Yang, WF Eanes. *PNAS* 42:16207-16211, 2008. Walt and coworkers demonstrated that variation for the diapause phenotype is caused by a single Lys/Ile substitution in one of the six cpo transcripts.

SUBJECT TO CHANGE: GETTING TO GRIPS WITH SCIENTIFIC VARIABLES

By J Lachance. *Nature* 454:916, 2008. Joe looks into the future of scientific research and finds that we will discover that the laws of physics are local, and moreover that they are cellular automata. But here is the kick: this is a sci-fi essay! Hey, whatever, it's still published in *Nature*...

