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Newsletter of the National Evolutionary Synthesis Center, an NSF-funded collaborative research center operated by Duke University, the University of North Carolina at Chapel Hill, and North Carolina State University.

IN THIS ISSUE:

NESCent welcomes targeted proposals in two new areas

NESCent welcomes targeted proposals in two new areas this fall. The first area focuses on research at the intersection of evolution and the social sciences. The second is for researchers interested in developing evolution education resources, specifically for K-12 under-represented minorities. The call is open for a limited time only, so please consider applying! Deadlines: September 1, 2011 or January 1, 2012. For more information turn to page 7.

NEXT PROPOSAL DEADLINES:

Dec. 1: postdoctoral fellowships, sabbaticals, catalysis meetings and working groups

Jan. 1: targeted proposals, graduate fellowships, short-term visitors

Jan. 15: journalists-in-residence

For more information, see page 7 or visit nescent.org/science/proposals.php

RESEARCH HIGHLIGHTS

Coping with climate change

Can we predict which species are least likely to be left behind in a warming world?

Dragonflies are one of several groups of species known to have shifted their range in response to global climate change. Shown here: Halloween Pennant (*Celithemis eponina*). PHOTO BY ERIC GREENE

As global temperatures rise, suitable sites for many plants and animals are shifting to cooler and higher ground. Can we predict which species will be able to move far or fast enough to keep up? A new study says the secrets to success in the face of a warming world are still elusive.

> "Some species are moving well ahead of the curve, while others seem to be stuck behind,"
>
> –Amy Angert, Colorado State University

Rather than sticking around and sweating it out, some groups of plants and animals are responding to rising temperatures by migrating northward and upward to higher latitudes and elevations, studies show.

But when researchers working at the National Evolutionary Synthesis Center and the National Center for Ecological Analysis and Synthesis took a closer look at recent range shifts, they noticed a peculiar pattern: some species are migrating much farther and faster than others.

"Some species are moving well ahead of the curve, while others seem to be stuck behind," said lead author Amy Angert, a biologist at Colorado State University.

Pinpointing what sets the fastest-shifting species apart from the stragglers could help scientists and policymakers predict which species are likely to be left behind in a warming world,

see CLIMATE CHANGE, p8

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RESEARCH HIGHLIGHTS

Cancer data not readily available for future research

Cancer studies less likely than other research fields to make data available for reuse

A new study finds that — even in a field like health and medicine with clear standards and online databases — the rate of public data archiving in cancer research is increasing only slowly. Furthermore, research studies in cancer and human subjects are less likely than other research studies to make their datasets available for reuse.

The results come from a study of patterns of research data availability conducted by Dr Heather Piwowar of the National Evolutionary Synthesis Center.

Data collected in scientific research is often useful for future studies by other investigators, but scientists have rarely made their raw research data widely available. Tools and initiatives are underway to encourage scientists to publicly archive their data. This analysis confirms there is still much room for improvement.

By querying the full text of the scientific literature through websites like Google Scholar and PubMed Central, Piwowar identified eleven thousand studies that collected a particular type of data about cellular activity, called gene expression microarray data. Only 45% of recent gene expression studies were found to have deposited their data in the public databases developed for this purpose. The rate of data publication has increased only slightly from 2007 to 2009. Data is shared least often from studies on cancer and human subjects: cancer studies make their data available for wide reuse half as often as similar studies outside cancer.

"It was disheartening to discover that studies on cancer and human subjects were least likely to make their data available. These data are surely some of the most valuable for reuse, to confirm, refute, inform and advance bench-to-bedside translational research," Piwowar said.

"We want as much scientific progress as we can get from our tax and charity dollars. This requires increased access to data resources. Data can be shared while maintaining patient privacy," Piwowar added, noting that patient re-identification is rarely an issue for gene expression microarray studies.

Most likely to share their data in public databases were investigators from Stanford University and those who published in the journal Physiological Genomics.

Scientists sometimes email each other to request datasets that aren't available online, but these requests often go unanswered or are denied by the original investigators. Publishing data in online data repositories is considered the best way to share data for future reuse.

> "We want as much scientific progress as we can get from our tax and charity dollars. This requires increased access to data resources."
> –Heather Piwowar, NESCent

Recent policies by the NSF seek to increase the amount of data disseminated from federally-funded research by requiring data management and dissemination plans in all new grant applications.

The findings were published in the open access journal PLoS ONE. ●

CITATION: Piwowar, H. (2011). "Who shares? Who doesn't? Factors associated with openly archiving raw research data." PLoS ONE 6(7): e18657. doi:18610.11371/journal.pone.0018657

In the spirit of the topic, the raw data behind this study are publicly available in the Dryad Digital Repository at **http://dx.doi.org/10.5061/dryad.mf1sd.**

"C'mon feel the noise" (Science Magazine) Some birds that live near noisy sites can alter their songs to deal with din. But closely related species with similar songs may tweak their tunes in different ways, says a new study led by NESCent's Clint Francis. Read more at **bit.ly/j7OfZV**.

"Scientists take Charles Darwin on the Road" (Miller McCune) A posse of evolutionary scientists traveled to the heart of America to share their excitement about science on the birthday of Charles Darwin. Read their story at **bit.ly/kP3F5y**.

"Hummingbirds catch flying bugs with the help of fast-closing beaks" (Eurekalert) The shape of a hummingbird's beak allows for a "controlled elastic snap" that allows it to snatch up flying insects in a mere fraction of a second – with greater speed and power than could be achieved by jaw muscles alone, finds NESCent postdoc Gregor Yanega. Learn more at **bit.ly/ouofCU**.

"Has Earth's sixth mass extinction already arrived?" (Radio In Vivo) NESCent's Jenny McGuire explains what climate change is likely to mean for mammals on the science radio show, Radio in Vivo. Listen to a podcast of the show at **bit.ly/ipCUu1**.

"Stable temperatures boost biodiversity in tropical mountains" (Eurekalert) The diversity of plants and animals in tropical mountain ranges may have something to do with the stable seasonal temperatures found near the equator relative to higher latitudes, a NESCent working group reports. Read the full story at **bit.ly/jgxWt2**.

"Little Aussie batter" (Good Weekend Magazine, Melbourne) In the Australian outback, NESCent's Peter Unmack finds a completely new species of fish. Find out why the tiny creature may be in big trouble at **bit.ly/oiEdAP**.

"Marine snails get a metabolism boost" (Eurekalert) Most of us wouldn't consider slow-moving snails to be high-metabolism creatures. But at one point in the distant past, snail metabolism sped up, says a new study co-authored by NESCent's Craig McClain. Read the full story at **bit.ly/j0xWfk**.

"Thinking big" (Science News) New research suggests human brain size evolution may have been driven by a metabolic shift that meant more fuel for brains, and less fuel for muscles. Biologist Greg Wray told the full story during a NESCent-organized panel at the annual AAAS meeting in Washington, DC: **bit.ly/gpz26k**.

"Cold-blooded cannibals: extreme adaptations to island life" (UK Guardian) Nearly 150 people viewed and voted on their favorite films at the first-ever NESCent Evolution Film Festival at this year's Evolution meetings in Norman, Oklahoma. Watch the first-place winner here, a film about a group of lizards with a rather sinister survival strategy: **bit.ly/iqJwJV**.

"Lizards as seed dispersers in island ecosystems" (UK Guardian) View another one of the fabulous entries in the 2011 NESCent Evolution Film Festival – this one about some unusual island lizards with a taste for fruit: **bit.ly/qdZbay.**

"Ancestry of polar bears traced to Ireland" (ScienceDaily) The female ancestor of all living polar bears was a brown bear that lived in the vicinity of present-day Britain and Ireland 20,000 to 50,000 years ago, just prior to the peak of the last ice age, a NESCent working group finds. Learn more at **bit.ly/qS9OXJ**.

"The future of a fog oasis" (Scientific American) In a fast-disappearing desert oasis, scientists are trying to bring a forest back to life – and discovering the imprint of a lost civilization amidst the vanishing trees. Read the latest results by NESCent postdoc Rafael Rubio de Casas at **bit.ly/nxAr0g**.

OPPORTUNITIES

Job openings

Interested in employment opportunities at NESCent? Our center runs with the help of a dynamic team of programmers, financial experts, event planners, and other specialists. To find out about job openings as they become available, visit **nescent.org/about/employment.php**.

COMING SOON

Human evolution symposium to be webcast live

Date: October 14, 2011
Time: 1:30 to 5:30 PM (PST)

Don't miss the webcast of this year's evolution symposium at the annual meeting of the National Association of Biology Teachers (NABT) on Friday, Oct. 14th. The 2011 symposium, entitled "Changing Humans in a Changing Environment," will provide an opportunity to hear directly from researchers who are adding to our growing understanding of the dynamic interplay between human evolution and the environment. Speakers will include Rick Potts (Smithsonian Institution), Jill Pruetz (Iowa State Univ.), Susan Antón (New York Univ.) and John Hawks (Univ. of Wisconsin).

If you can't make it to the meeting in Anaheim, CA, you can still participate via live webcast. To watch, and submit your live questions to the speakers, tune in Friday, Oct. 14th from 1:30 to 5:30 pm PST (4:30 - 8:30 pm EST) at **dukeuniversity.acrobat.com/nabt2011**.

Find the talks – along with activities, websites and other resources for teaching human evolution – after the meeting at **nescent.org/media/NABTSymposium2011.php**.

RESEARCH HIGHLIGHTS

Can you hear me now?

Songbirds tweak their tunes in different ways to cope with clamor

Some birds that live near noisy sites can alter their songs to deal with din. But closely related species with similar songs may tweak their tunes in different ways, says a new study led by NESCent postdoc Clinton Francis.

The study is part of a growing field that looks at noise pollution and its effects on wildlife. Honking horns, blaring sirens, and roaring machinery are particularly problematic for birds, Francis said.

Birds rely on songs to defend their territories and attract a mate. "When something interferes with their ability to hear each others' songs, it can lead to a communication breakdown," Francis explained. Noise can drown out other sounds in the environment too, like approaching predators, he added.

Scientists would like to be able to predict which species will be most threatened by increasing noise. While some birds can cope with noise by altering their songs, less flexible birds may have to abandon noisy areas altogether. Can we predict which species will be able to adjust their songs, and which will be forced to flee?

To do that, it helps to know if closely related species respond to noise in similar ways. To find out, Francis and his colleagues surveyed two closely related species with similar songs —the grey vireo and the plumbeous vireo — both living near natural gas extraction sites in Rattlesnake Canyon Wildlife Area in northern New Mexico.

Francis has studied the effects of industrial-grade noise from natural gas wells on songbirds since 2005. The advantage of studying these sites, Francis notes, is they offer plenty of noise without the confounding factors that plague noisy sites near roadways, such as pollution and collisions.

Some gas wells are coupled with noisy compressors that extract the gas and transport it through pipelines. The compressors roar and rumble day and night, 365 days a year at greater than 95 decibels —a noise level comparable to a motorcycle less than 50 feet away. "You need hearing protection if you're next to them," Francis said.

Grey vireos (Vireo vicinior) cope with noise by altering their songs.
PHOTO BY CLINTON FRANCIS.

The researchers counted and recorded plumbeous vireos and grey vireos living near natural gas wells with noisy compressors. They then compared this data with song and survey data they collected from quiet wells without compressors.

> "Closely related species may use different strategies to deal with noise."
> –Clinton Francis, NESCent

The researchers discovered that both species are just as common in noisy sites as quiet ones, but they alter their songs in different ways.

Each vireo's song is a short whistled phrase with multiple notes, like a musical score, Francis explained. "Plumbeous vireos raised the pitch of the lowest part of their song, while grey vireos raised the pitch of the highest part of their song," he said. Singing higher-pitched songs may make them easier to hear above the low frequencies typical of human-made noise, he added.

Both birds changed the length of their songs too, though in opposite ways. Whereas plumbeous vireo songs got shorter with increased background noise, grey vireo songs grew longer. "Grey vireo songs in noisy sites were nearly one and a half times as long as their counterparts in quiet sites," Francis said.

The results back up other studies showing some birds can cope with noise by altering their songs. But given the different modifications made by closely related species, Francis said, it may be difficult to predict what bird communities will sound like in noisy habitats in the future.

"Closely related species may use different strategies to deal with noise," he said.

The findings appeared in the May 25 issue of Biology Letters. ●

CITATION: Francis, C., C. Ortega, et al. (2011). "Different behavioural responses to anthropogenic noise by two closely related passerine birds." Biology Letters. doi:10.1098/rsbl.2011.0359.

COMING SOON

Supporting Chicano and Native American scientists

What: SACNAS national conference

When: October 27-30, 2011

Where: San Jose, CA

NESCent is once again partnering with several organizations to put together an exciting suite of activities at the annual meeting of the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), to be held this October in San Jose, CA.

Our 2011 lineup includes a scientific symposium featuring three speakers (postdoctoral fellows from NESCent, NCEAS and NIMBioS), an evolution/ecology career mentoring session, a field trip to Stanford University's Jasper Ridge Biological Preserve, and our ever-popular movie night. This year's movie night will be held at the IMAX theater at San Jose's Tech Museum, so we expect the event to be bigger and better than ever! The movie will be "Under the Sea", which explores marine biodiversity and the effects of climate change in Southern Australia and the Indo-Pacific.

As always, the goal of these activities is to expose underrepresented minority students to ecology and evolution in greater depth, and to excite them about pursuing graduate studies and careers in these fields.

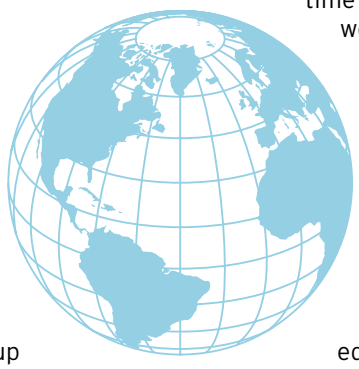
If you are attending the SACNAS conference this year, please plan to participate!

Our partners and co-sponsors include AIBS, ESA, NCEAS, NIMBioS and SSE. For more information, contact Dr. Jory Weintraub at **jory@nescent.org**.

NESCent outreach goes global

Enabling scientists worldwide to make the most of their data

NESCent outreach is going global! Thanks to a two-year, $246,515 grant from the National Science Foundation, we will collaborate with local partners in communities worldwide to offer hands-on training through our newly-launched NESCent Ambassador Program.



The goal of the program is to enable scientists in developing countries to use existing informatics tools to make the most of the data they collect. In addition to offering short (one to two-week) courses and workshops, we will provide one-on-one and small group consultation to local scientists in the field, classroom or computer lab, using their actual datasets. Just as importantly, we hope to create transformative experiences for our scientists too – especially as they share their own research with the local science community, explore new collaborations with resident scientists, and discuss their work with local schools and communities.

In 2011-2012, NESCent plans to send 20 scientists to partner with communities in eight countries around the world. By the time this newsletter goes to press, we will have already completed ambassadorships at the Universidad San Francisco de Quito in Ecuador and the Galapagos, at the Indonesian Biodiversity Research Center in Bali, and at the Centre ValBio in Madagascar. In November 2011 we plan to offer a series of workshops on evolution education to high school teachers and undergraduate instructors throughout the Caribbean, in collaboration with our partners at the Caribbean Examinations Council. Lastly, plans are also in place for two ambassadorships in February 2012 – a return to Ecuador, and another at the Kenya Medical Research Institute (KEMRI) in Kilifi, Kenya.

To find out more about NESCent workshops offered around the world, and how you can get involved, visit **www.nescent.org/ambassadors**.

COMING SOON

Win a travel award for best evolution-themed blog

Deadline: December 1, 2011

Are you a blogger who is interested in evolution? The National Evolutionary Synthesis Center is offering two travel awards to attend ScienceOnline2012, a science communication conference to be held January 19-21, 2012, at North Carolina State University in Raleigh, NC.

The awards offer the opportunity to travel to North Carolina to meet with several hundred researchers, writers, editors and educators to explore how online tools are changing the way science is done and communicated to the public. Each winner will receive $750 to cover travel and lodging expenses to attend the conference. For more information about the program for this year's conference, visit **http://scio12.wikispaces.com/Program+Suggestions**.

To apply for an award, writers should submit a blog post that highlights current or emerging evolutionary research. In order to be valid, posts must deal with research appearing in the peer-reviewed literature within the last five years. Posts should be 500-1000 words, and must mention the NESCent contest. Two recipients will be chosen by a panel of judges from both NESCent and the science blogging community. Please send your name, contact information, the title and date of your blog post, and a URL to **travel.award@nescent.org**. Winners will be notified by December 15th, 2011.

For more information contact Craig McClain at **cmcclain@nescent.org**, or Robin Smith at **rsmith@nescent.org**.

PUBLICATIONS

Recent publications by NESCent authors

Bilbo, S., G. Wray, et al. (2011). "Reconstitution of the human biome as the most reasonable solution for epidemics of allergic and autoimmune diseases." Medical Hypotheses. doi:10.1016/j.mehy.2011.1006.1019.

Cadena, C., K. Kozak, et al. (2011). "Latitude, elevational climatic zonation, and speciation in New World vertebrates." Proceedings of the Royal Society B.

Cohen, O. and T. Pupko (2011). "Inference of gain and loss events from phyletic patterns using stochastic mapping and parsimony – a simulation study." Genome Biology and Evolution. In press.

Dornburg, A., B. Sidlauskas, et al. (2011). "The influence of an innovative locomotor strategy on the phenotypic diversification of triggerfish (family: Balistidae)." Evolution 65(7): 1912-1926.

Erpenbeck, D., J. Schmitz, et al. (2011). "First evidence of miniature transposable elements in sponges (Porifera)." Hydrobiologia. doi:10.1007/s10750-011-0775-4.

Evans, M., D. Hearn, et al. (2011). "Extreme environments select for reproductive assurance: evidence from evening primroses (Oenothera)." New Phytologist 191(2): 555-563.

Finnegan, S., C. McClain, et al. (2011). "Escargots through time: an energetic comparison of marine gastropod assemblages before and after the Mesozoic Marine Revolution." Paleobiology 37(2): 252-269.

Francis, C., C. Ortega, et al. (2011). "Different behavioural responses to anthropogenic noise by two closely related passerine birds." Biology Letters. doi:10.1098/rsbl.2011.0359.

Francis, C., C. Ortega, et al. (2011). "Importance of juniper to birds nesting in piñon-juniper woodlands in northwest New Mexico." Journal of Wildlife Management. doi:10/1002/jwmg.200.

Francis, C., J. Paritsis, et al. (2011). "Landscape patterns of avian habitat use and nest success are affected by chronic gas well compressor noise." Landscape Ecology. doi:10.1007/s10980-011-9609-z.

Gelfman, S., D. Burstein, et al. (2011). "Changes in exon-intron structure during vertebrate evolution affects the splicing pattern of exons." Genome Research. In revision.

Goff, S., M. Vaughn, et al. (2011). "The iPlant Collaborative: Cyberinfrastructure for Plant Biology." Frontiers in Plant Genetics and Genomics 2: doi: 10.3389/fpls.2011.00034.

Hartline, D. (2011). "The evolutionary origins of glia." Glia 59: 1215-1236.

Kowalewski, M., J. Payne, et al. (2011). "The Geozoic Supereon." PALAIOS 26(5): 251-255.

Ksepka, D., M. Benton, et al. (2011). "Synthesizing and databasing fossil calibrations: divergence dating and beyond." Biology Letters. doi: 10.1098/rsbl.2011.0356.

Lapp, H., R. Morris, et al. (2011). "Organizing our knowledge of biodiversity." Bulletin of the American Society for Information Science and Technology 37(4): 38-42.

Meachen-Samuels, J. (2011). "Morphological convergence of the prey-killing arsenal of sabertooth predators." Paleobiology. In Press.

Moczek, A., S. Sultan, et al. (2011). "The role of developmental plasticity in evolutionary innovation." Proceedings of the Royal Society B. doi: 10.1098/rspb.2011.0971.

Pieplow, N. and C. Francis (2011). "Song differences among subspecies of Yellow-eyed Juncos (Junco phaeonotus): how different is Baird's Junco (J. p. bairdi) song?" Wilson Journal of Ornithology.

Piwowar, H. (2011). "Who shares? Who doesn't? Factors associated with openly archiving raw research data." PLoS ONE 6(7): e18657. doi:18610.11371/journal.pone.0018657

Piwowar, H., T. Vision, et al. (2011). "Data archiving is a good investment." Nature 473(7347): 285-285.

Popa, O., E. Hazkani-Covo, et al. (2011). "Directed networks reveal barriers and bypasses to lateral gene transfer in prokaryotes." Genome Research 21: 599-609.

Privman, E., O. Penn, et al. (2011). "Improving the performance of positive selection inference by filtering unreliable alignment regions." Molecular Biology and Evolution. In press.

Pupko, T. (2011). "Evolution after gene duplication." Trends in Evolutionary Biology 3(e1).

Revell, L., D. Mahler, et al. (2011). " A new phylogenetic method for identifying exceptional phenotypic diversification." Evolution. In press.

Roberts, T., H. Lanier, et al. (2011). "Molecular phylogeny of treeshrews (Mammalia: Scandentia) and the timescale of diversification in Southeast Asia." Molecular Phylogenetics and Evolution.

Rubinstein, N., A. Doron-Faigenboim, et al. (2011). "Evolutionary models accounting for layers of selection in protein coding genes and their impact on the inference of positive selection." Molecular Biology and Evolution. In press.

Rubinstein, N., D. Zeevi, et al. (2011). "The operonic location of auto-transcriptional repressors is highly conserved in bacteria." Molecular Biology and Evolution. In press.

Ruzzante, D. and J. Rabassa (2011). "Paleogeography and paleoclimatology of Patagonia: Implications for biodiversity." Biol. J Linnean Society.

Servedio, M., G. Van Doorn, et al. (2011). "Magic traits in speciation: 'magic' but not rare?" TREE 26(8): 389-397.

Smith, M., G. Yanega, et al. (2011). "Elastic instability model of rapid beak closure in hummingbirds." Journal of Theoretical Biology 282: 41-51.

Speiser, D., D. Eernisse, et al. (2011). "A chiton uses aragonite lenses to form images." Current Biology 21: 665-670.

Wall, C., C. Vinyard, et al. (2011). "Overview of FEED, the Feeding Experiments End-user Database." Integrative and Comparative Biology 51(2): 215-223.

Williams, C. (2011). Evolutionary dynamics of forests under climate change. To be released Oct. 2011. Springer.

Wilson, C. and D. Hartline (2011). "The novel organization and development of copepod myelin. I. Ontogeny." The Journal of Comparative Neurology. doi: 10.1002/cne.22695.

Wilson, C. and D. Hartline (2011). "The novel organization and development of copepod myelin. II. Non-glial origin." The Journal of Comparative Neurology. doi: 10.1002/cne.22699.

Xie, X., W. Qiu, et al. (2011). "Accelerated and adaptive evolution of yeast sexual adhesins." Molecular Biology and Evolution. doi: 10.1093/molbev/msr145.

CALL FOR PROPOSALS

NESCent wants to hear from you!

Looking for support for a graduate student, faculty sabbatical, short-term visit or meeting? NESCent welcomes your proposals. We are looking to support innovative approaches to outstanding problems in evolutionary biology. In particular, proposals that have a clear interdisciplinary focus, or involve evolutionary concepts in non-traditional disciplines, are strongly encouraged, as are proposals that demonstrate international participation and a mix of senior and emerging researchers, including graduate students.

Proposals for short-term visits are 2 weeks to 3 months. Proposals for sabbaticals may be for up to a full year. The next deadline for sabbaticals, postdoctoral fellowships, catalysis meetings and working groups is December 1. For short-term visitors and graduate fellowships, the next deadline is January 1. Targeted proposals are due January 1 as well.

For more information, please visit **nescent.org/science/proposals.php**.

NESCent welcomes proposals in two new areas

As part of NESCent's ongoing effort to stimulate research and education beyond traditional boundaries, we welcome meeting proposals in two new areas in 2011-2012:

1) Evolution and the social sciences: Proposals are now being accepted for meetings that explore the intersection of the evolutionary and social sciences. We welcome proposals that seek to understand the value of evolutionary thinking in a particular social science, or conversely, how social science can inform evolutionary studies of human (and perhaps, other species') biology.

2) K-12 evolution education for underrepresented minorities: We also welcome proposals for meetings aimed at creating new programs, activities or initiatives that would increase participation in evolutionary science among K-12 underrepresented minorities. Competitive proposals will not only define the target audience(s) and outline strategies for developing innovative activities, but will also include detailed plans for implementation and assessment. Proposals should also indicate how activities and programs align with state and/or federal education standards.

When preparing your proposal(s), please consider which of two kinds of meetings would work best for your project:

• Catalysis Meetings: These one-time meetings bring together ~30 scientists from diverse disciplines to focus on a major question or research area in evolutionary science. Catalysis Meetings typically last for 3-5 days.

• Working Groups: Working Groups involve small groups of scientists (10-12 participants) collaborating intensively on the analysis or synthesis of data, models or both, to address a major question in evolutionary science. Working groups will typically meet 3-4 times over two years, with each meeting lasting 3-5 days.

Meeting proposals that are significantly interdisciplinary, and that demonstrate international or minority participation as well as a mix of senior and emerging researchers, including graduate students, are encouraged.

Researchers are also welcome to submit more than one proposal. We particularly encourage proposals that plan synergistic activities between two or more of the following: working groups, catalysis meetings, postdoctoral fellows, sabbatical scholars, short-term fellows, or graduate students. Each proposal should be submitted separately, and should include a clear statement of which proposals or activities they plan to link.

NESCent will not support collection of new data or field research, but encourages the synthesis of existing data and information resources. NESCent is committed to making data, databases, software and other products that are developed as part of NESCent activities available to the broader scientific community.

To learn more about types of proposals, and the proposal process, please visit **nescent.org/science/proposals.php**, or contact Dr. Allen Rodrigo (**a.rodrigo@nescent.org**).

COMING SOON

Darwin Day goes on the road, again

What: Darwin Day Roadshow
When: February 2012
Where: Coming to a state near you

On the heels of last year's resounding success, NESCent has begun planning for the 2012 edition of the Darwin Day Roadshow. The program was conceived as a way to share the excitement of evolutionary science with students and the general public in communities around the country, on the occasion of Charles Darwin's birthday. The goal of the event is to reach out to audiences that wouldn't normally have such a celebration, as opposed to audiences in larger cities and towns that are already served by museums, science centers, etc.

In 2011, NESCent scientists traveled to rural communities in Virginia, Iowa, Nebraska and Montana to talk to students, teachers and the general public about research and career opportunities in evolution. The visits included one middle school, three high schools, one university and two museums/science centers. It was a tremendously positive experience for all involved, including our scientists. You can read an article about the event in the New York Times at **nytimes.com/2011/02/15/us/15darwin.html**, as well as a firsthand account by NESCent's Craig McClain at **miller-mccune.com/science/scientists-take-charles-darwin-on-the-road-31211/**.

Inspired by the success of our 2011 event, a new crop of NESCent scientists plans to hit the road in February of 2012. The goal is to visit several additional states (eventually visiting all 50!) and increase the number of NESCent scientists participating each year. To find out more, including how to apply to add your community to our route, visit **darwinday roadshow.wordpress.com**, or contact Dr. Jory Weintraub at **jory@nescent.org.**

CLIMATE CHANGE, continued

the researchers said.

"The species that aren't able to expand their range are the ones we need to spend more resources protecting," said co-author Sarah Gilman of Claremont McKenna College in California.

The researchers wondered if general traits such as body size, diet and lifespan might help scientists predict which species are likely to keep pace as weather warms.

To find out, they looked at data gathered from more than 400 species of birds, plants, insects and mammals known to have shifted their ranges to different degrees in the last century in response to warming.

The data set included North American birds such as house finches and bald eagles, dragonflies and damselflies in Europe, grasses and other plants in the Swiss Alps, and small mammals such as shrews, mice and chipmunks in the Sierra Nevada of California.

Models predict that the species quickest to expand their range will be those that reproduce the fastest, disperse the farthest, and are the least picky about food, shelter, or mates.

Chipmunk. PHOTO BY RICHARD FABI, WIKIMEDIA COMMONS

To find out if predictions hold true, the researchers compiled data on how far each species had shifted, and compared it to various features of the species themselves, such as their mode of dispersal, breeding rate, and dietary preferences.

The result? Global warming's winners and losers may be hard to predict with models based on broad traits related to dispersal ability or reproduction, the researchers report.

"For each group we found one or more traits that explain some variation in recent range shifts, but none with clear influence across all groups," wrote Angert, who studies the effects of climate change on range shifts in monkeyflowers.

One possibility is that the traits that really matter for a species' ability to move to more suitable sites — such as temperature tolerance — are difficult to measure or find a proxy for, the authors argue.

Another possibility is that external factors, such as habitat fragmentation and availability, are just as important as the species themselves. Plants and animals on mountain peaks or near the poles may simply have nowhere cooler to go, the researchers explained.

The findings were published in Ecology Letters. ●

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