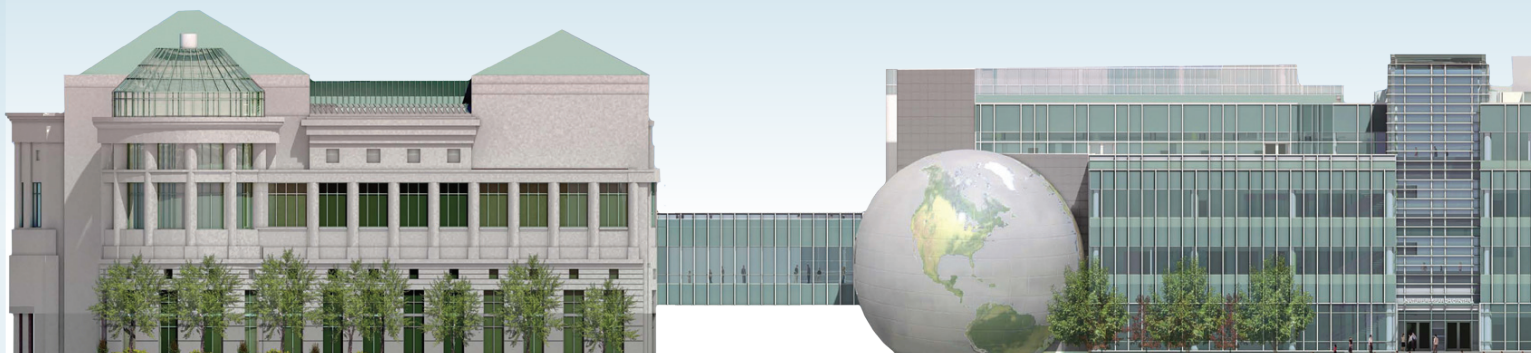


# NATURESEARCH

---

## NEWSLETTER



Issue 01  
September 2011

## Welcome

---

Welcome to the first issue of our newsletter *NATURESEARCH*! Its mission is to report the research, discoveries, grants and publications of the North Carolina Museum of Natural Sciences and its new wing, the Nature Research Center (NRC). With over two million specimens, The Museum houses one of the largest natural history collections in the southeastern United States, amassed over its 132-year history, and is the largest natural science museum in the Southeast. In 2012, the Museum will significantly add to its scientific and education staff with the opening of 80,000 square feet of exhibits, new laboratory space, and innovative educational venues for science communication ([www.naturesearch.org](http://www.naturesearch.org)). The iconic technology theater, called the SECU Daily Planet, has the capability to broadcast broader impacts of scientific discoveries to all classrooms throughout North Carolina as well as a global reach, using the Internet2 network. To celebrate the scientific achievements of the past, and to inspire transformational research into the future, we are honored to launch the first issue of *NATURESEARCH*. Historically, most museum exhibits have featured “what we know about science.” As an innovative departure from this conventional mission, the NRC will focus on “how we know what we know about science.” Many exhibits will feature the concept of how scientists work and engage the public in experiencing scientific research first-hand.

The NRC opens April 20, 2012. Thank you for your partnership, support and ideas as we work together to inspire science literacy both locally and globally. STEM (science, technology, engineering and mathematics) education is the backbone of a sound economy, and the Museum looks forward to contributing to this important goal for the next generation. We hope to foster unique collaborations and programs with our team of scientists, educators, technology experts, staff and volunteers.



Dr. Karen Giroux  
Director,  
Research & Collections



Dr. Meg Lowman  
Director,  
Nature Research Center

### The NRC has four priorities:

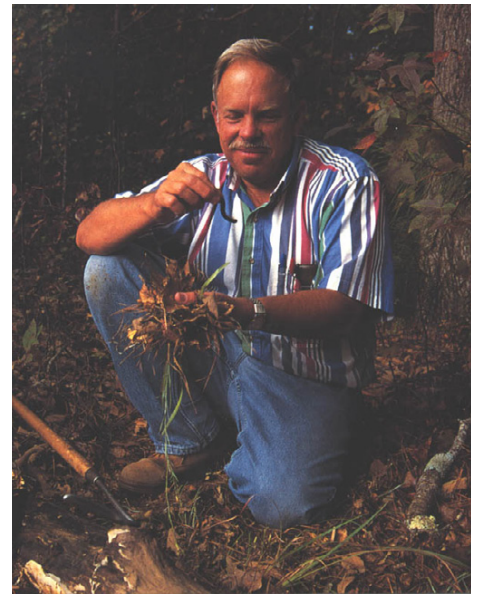
1. Cutting-edge, professional science expanding on existing research at the Museum;
2. Engaging a diverse audience, including “citizen scientists,” in scientific re-search projects in innovative ways;
3. Diversity in our staff and audience, to ensure role models for the next generation of scientists;
4. Integration of “virtual” with “real” nature, by linking our collections and fieldwork to technologies that include modeling, simulation, mobile applications and gaming.

## Millipeds and Continental Drift

*How can studying living creatures with tiny legs and no wings today tell us something about the world 300-500 million years ago?*

Mapping the distributions of the 16 milliped orders (Phylum Arthropoda: Class Diplopoda) led Dr. Rowland Shelley, Curator of Terrestrial Invertebrates, to a hypothesis that may hold relevance for other nonflying, poorly mobile, soil organisms. Today, millipeds occur on most continents and islands but they originated in only one place and at one time. How did organisms that cannot run, fly, swim or float spread throughout the world without aid by man or other vertebrates? Dr. Shelley's detective work indicates that for hundreds of millions of years, millipeds "rode" small and large tectonic "land rafts" as they drifted atop Earth's liquid mantle of magma and became separated by past and present oceans. Life began in the sea, but there are no known marine milliped fossils. Their unique anatomical features, including adaptations for a burrowing lifestyle, logically evolved on land since they would not have provided an advantage for burrowing in soft marine sediments. The clues reveal that only one scenario accounts for the long-distance movement of a taxon with tiny legs and no wings. Around 525 million years ago (mya), an unknown marine ancestor crawled ashore onto the Avalonia section of the continent, Gondwana, the giant land mass that now represents South America, Africa, Arabia, Madagascar, India, Australia, New Zealand and Antarctica. A period of rapid evolution and radiation ensued as ancestral millipeds dispersed. About 480 mya, Avalonia rifted or separated from Gondwana and began drifting northward, thereby dividing the existing milliped populations. The ancestral populations on Avalonia were trapped there while it drifted for 30 million

years. Around 450 mya, Avalonia collided with the uninhabited "micro-continent" Baltica, enabling its milliped populations to spread. Another period of rapid divergence and radiation resulted and evolution proceeded in a different direction. Ten million years later, the fused land mass of Avalonia + Baltica collided with the unoccupied micro-continent Laurentia creating Euramerica, now represented by Europe, North America and Greenland. A third period of rapid divergence and radiation ensued in Euramerica while Gondwanan populations continued to evolve and disperse. Around 415 mya, simultaneous with the first milliped fossilizations in the part of Euramerica that now forms Scotland, the land terrane that has become northern China rifted from the region of Gondwana that now represents Australia, and around 400 mya, the land masses that formed southern China and southeastern Asia rifted from the same area of Gondwana. Each carried Gondwanan millipeds while colliding sequentially with the micro-continent of Siberia + Kazakhstan, thereby ferrying their inhabitants to present-day Asia, where they intermingled with forms that had dispersed from Euramerica after it too merged with Siberia + Kazakhstan. Likewise ~306 mya, Euramerica merged with the region of Gondwana that became South America, thereby allowing their faunas to mix. A complete explanation of the taxonomic and biogeographic study of millipeds is far more complex and helps to explain how ancestral millipeds, and perhaps other poorly mobile organisms, spread over time throughout Earth's land masses.



### Geology and Biology converge to describe a young planet.

What we now know as stable continents formed from many collisions and "rifts" over many millions of years and the distribution of relatively immobile fauna confirms this history that was first documented by geologists.



## Recent Research

### Dr. Chris Tacker

*Curator of Geology*



Dr. Chris Tacker is finishing the second year of a three-year NSF grant supporting apatite group mineral synthesis and analysis by infrared spectroscopy and electron microprobe. He recently attended a volcanology conference in Montserrat, British West Indies, and returned with specimens from the Soufriere Hills volcano. Apatite minerals in the volcanic rocks record the behavior of gases that drive explosive eruptions. Analysis should yield new insights on the behavior of these gases deep below the volcano. He continues collaborative research on Ediacaran fossils and tissue preservation in coleoid cephalopods with Trish Weaver, the geology and paleontology collections manager. Additional collaboration with Lisa Gatens, our curator of mammals, examines mercury in NC bats and sediments.

### Dr. Bryan Stuart

*Curator of Herpetology*



Turtles are harvested and traded throughout Asia for food, traditional medicine and pets. The demand for turtles now threatens the majority of Asian species with extinction in the wild, a phenomenon known as the “Asian turtle crisis.” Dr. Bryan Stuart reports the wild discovery of one such species in the journal *Biological Conservation* — a major step in advancing Asian turtle conservation efforts. During three field surveys, Stuart’s colleagues Tri Ly and Huy Duc Hoang from the University of Science in Ho Chi Minh City, Viet Nam, along with three local villagers and their turtle-tracking dogs, found a total of eight Vietnamese box turtles. “This discovery provides the first opportunity to conserve this species,” Stuart said, “and provides hope for determining the wild origin of other rare species that are known to scientists only by turtles bearing price tags.”

### Vince Schneider

*Curator of Paleontology*



For the second year, Vince Schneider led a small group of volunteers to our Arizona field site located in the Triassic Chinle Formation in eastern Arizona, not far from where the large Arizona fire occurred in June. They worked an historic Triassic fossil locality, the Placerias Quarry, considered by many to be one of the world’s richest Triassic vertebrate sites. They met with Dr. Andy Heckert and his students from Appalachian State University and spent the next eight days excavating the remains of numerous crocodylian-like archosaurs, especially those of aetosaurs and phytosaurs. The aetosaurs were completely covered with dermal armor that looks like a reptilian version of an armadillo. The phytosaurs looked superficially like modern-day gavials. This work compliments the Museum’s work in the North Carolina Triassic where they have uncovered many of these same types of animals.

## 2010 Publications *(\* indicates not peer-reviewed)*

- \***Beane, J.** 2010. The season: Jeff Beane's guide to natural North Carolina. North Carolina Wildlife Federation Journal, winter 2010:17.
- \***Beane, J.** 2010. Herp-a-day: A personal challenge. NC Herps 33(2):11-15.
- \***Beane, J.** 2010. Portraits of diversity: Reptiles. Wildlife in North Carolina 74(5):20-25
- \***Beane, J.** 2010. The season: Jeff Beane's guide to natural North Carolina. North Carolina Wildlife Federation Journal, spring 2010:14.
- \***Beane, J.** 2010. North Carolina wild notebook: Staying in school. Wildlife in North Carolina 74(7):32-35.
- \***Beane, J.** 2010. The Great Gopher Tortoise. NC Herps 33(3):13-14.
- \***Beane, J.** 2010. Survival tactics. Fifteen501 5(3):72-73.
- \***Beane, J.** 2010. Survival tactics. Wake Living 5(3):82.
- \***Beane, J.** 2010. North Carolina wild notebook: Horde of the flies. Wildlife in North Carolina 74(9):32-35.
- \***Beane, J.** 2010. Map quest. Wildlife in North Carolina 74(11):4-9.
- \***Beane, J.** 2010. Grossing out predators. North Carolina Naturalist 18(2):4-5.
- \***Beane, J.** 2010. Portraits of diversity: Amphibians. Wildlife in North Carolina 74(12):20-25.
- Beane, J. C., A. L. Braswell, J. C. Mitchell, W. M. Palmer, and J. R. Harrison III.** 2010. Amphibians and Reptiles of the Carolinas and Virginia. Second Edition, Revised and Updated. University of North Carolina Press, Chapel Hill. vii + 274 pp.
- Beane, J., and J. E. Corey III.** 2010. New geographic distribution records for reptiles from North Carolina, USA. Herpetological Review 41(3):388-391.
- Moorman, C. E., and **J. C. Beane.** 2010. Natural history notes: *Virginia valeriae valeriae* predation. Herpetological Review 41(1):101.
- Doucet-Beaupre, H. S. Breton, E.G. Chapman, P.U. Blier, **A.E. Bogan**, S.T. Stewart and W.R. Hoeh. 2010. Mitochondrial phylogenomics of the Bivalvia (Mollusca): search for the origin and mitogenomic correlates of doubly uniparental inheritance of mtDNA. *BMC Evolutionary Biology* 10:50 [19 pages] doi:10.1186/1471-2148-10-50. [http:// www.biomedcentral.com/1471-2148/10/50](http://www.biomedcentral.com/1471-2148/10/50)
- Eads, C.B, R.B. Bringolf, R.D. Greiner, **A.E. Bogan** and J.F. Levine. 2010. Fish hosts of the Carolina Heelsplitter (*Lasmigona decorata*), a federally endangered freshwater mussel (Bivalvia: Unionidae). *American Malacological Bulletin* 28(1/2):151-158.
- Bogan, A.E.** 2010. Preface. IN: Rudzíte M., Dreijers E., Ozolina-Moll L., Parele E., Piláte D., Rudzítis M., Stalažs A. 2010. Latvijas gliemji: Sugu noteicéjs. A Guide to the Molluscs of Latvia. LU Akadémiskais apgáds, Ríga, 252 pp.
- Bogan, A.E.** and **J.M. Smith.** 2010. A recent Paper Nautilus from Wrightsville Beach, North Carolina. *NC Shellclub Newsletter* March 2010:5.
- Bogan, A.E.** and **J.M. Smith.** 2010. Freshwater mollusks of the Atlantic Slope Faunal Region of eastern North America. Pages 17-38. In:S. McMurray and H. Dunn, editors. Regional Fauna Identification and Sampling. Workshop Notebook with color figures. FMCS 2010 Workshop, St. Louis, MO. [cd in back with all text and additional pdf files].
- Brinkman, Paul.** 2010. The Second Jurassic Dinosaur Rush: Museums & Paleontology in America at the Turn of the Twentieth Century. Chicago and London: University of Chicago Press.
- Brinkman, Paul.** 2010. "The second Jurassic dinosaur rush and the dawn of dinomania." *Endeavour* 34(3): 104-111.
- Brinkman, Paul.** 2010. "Charles Darwin's Beagle voyage, fossil vertebrate succession, and the gradual birth & death of species." *Journal of the History of Biology* 43(1): 363-399.
- Brinkman, Paul.** 2010\*. "Review of: *The Earth on Show: Fossils and the Poetics of Popular Science, 1802-1856.*" *Museum History Journal* 3(2): 281-282.
- Brinkman, Paul D.** 2010. *The Second Jurassic Dinosaur Rush: Museums & Paleontology in America at the Turn of the Twentieth Century.* Chicago and London: University of Chicago Press. 345pp.

## 2010 Publications continued (\* indicates not peer-reviewed)

- Cooper, J. E.** 2010. Annotated checklist of the crayfishes of North Carolina, and correlations of distributions with hydrologic units and physiographic provinces. *Journal of the North Carolina Academy of Science* 126(3):69-76.
- Cooper, J. E., and M. R. Cooper.** 2010. Long-term mark-recapture studies of population sizes in the stygobiotic crayfishes (Decapoda: Cambaridae) of Shelta Cave, Alabama, USA. *Subterranean Biology* 7:35-40.
- Cooper, J. E., and M. R. Cooper.** 2010. Observations on the biology of the endangered stygobiotic shrimp *Palaemonias alabamae*, with notes on *P. ganteri* (Decapoda: Atyidae). *Subterranean Biology* 8:9-20.
- Cooper, J. E., and J. E. Price.** 2010. A new spinose crayfish of the genus *Cambarus*, subgenus *Puncticambarus* (Decapoda: Cambaridae), from South Carolina. *Proceedings of the Biological Society of Washington* 123(4):335-344.
- \***Fuller, L.** 2010. Painted Buntings on the Rebound? Citizen Science Helping Solve the Mystery. *Cape Fear's Going Green* 3(2):6-7.
- \***Fuller, L.** 2010. Vulture Vomit. *North Carolina Naturalist* 18(2):6-7.
- Savage, A.L., Moorman, C.E., **Gerwin, J.A.**, Sorenson, C. 2010. Prey selection by Swainson's warblers on the Breeding Grounds. *The Condor* 112(3):605-614.
- \***Lowman, M.D.** 2010. CSI in Ethiopia: Children Survey Insects. *North Carolina Naturalist* 18 (2): 8-9.
- Lowman, M.D.** 2010. Finding sanctuary – saving the biodiversity of Ethiopia one church forest at a time. *The Explorers Journal* 88: 26
- Lowman, M.D.** 2010. Forest canopies – a scientific history. IN: J. Bhaskar, Amazonia – Perspectives of a Jungle. Fine Arts Publications, Savannah GA.
- Lowman, M.D.** and Mourad T. 2010. Bridging the divide between virtual and real nature. *Frontiers in Ecology and Environment. Frontiers in Ecology and the Environment* 8 (7): 339.
- Voirin, B, Kayes R., Wikelski M., **Lowman M.D.**. 2010. Sloth defecation behavior. *International Journal of Ecology.*
- Pratt, H. D.** 2010. Family Drepanididae (Hawaiian honeycreepers). pp. 618-659 in del Hoyo, J., Elliott, A. & Christie, D. A., eds. *Handbook of the Birds of the World*. Vol. 15. Lynx Edicions, Barcelona.
- Pratt, H. D.**, M. Falanruw, M. T. Etpison, A. Olsen, D. Klauber, D. W. Buden, P. Clement, A. Gupta, D. R. Herter, H. Ketebengang, P. Pisano, D. S. Vice, & Y. P. Yalap. 2010. Noteworthy bird observations from the Caroline and Marshall Islands 1988-2009, including five new records for Micronesia. *Western Birds* 41:70-100.
- Pratt, H. D.** 2010. [Review] Lars Jonsson's *Birds: Paintings from a Near Horizon*, by Lars Jonsson. 2009. Princeton University Press, Princeton, NJ. *Auk* 127:721-724.
- Pratt, H. D.** 2010. Revisiting species and subspecies of island birds for a better assessment of biodiversity. *Ornithological Monographs* 67:79-89.
- Green JL, **Schweitzer MH**, Lamm E-T. Limb bone histology and growth in *Placerias hesternus* (therapsida: anomodontia) from the Upper Triassic of North America. 2010. *Paleontology* 53(2):347-364.
- Howarth, F.G., & **R.M. Shelley.** 2010. The Asian polydesmidan milliped, *Helicorthomorpha holstii* (Pocock) (Paradoxosomatidae), established in Hawai'i. *Bishop Museum Occasional Papers* 108:45-46.
- Shelley, R.M.** 2010. Occurrence of the milliped, *Hiltonius carpinus carpinus Chamberlin*, 1943 (Spirobolida: Spirobolidae), in the United States and new records from Mexico. *Insecta Mundi* 116:1-3.
- Koch, M., G.D. Edgecombe, & **R.M. Shelley.** 2010. Anatomy of *Ectonocryptoides* (Scolopocryptopidae: Ectonocryptopinae) and the phylogeny of blind Scolopendromorpha (Chilopoda). *International Journal of Myriapodology* 3:51-81.
- Shelley, R.M.**, C.H. Richart, & **A.E. Bogan.** 2010. *Octoglena claraqua*, n. sp. (Polyzoniida: Hirudisomatidae), a new milliped from Idaho, USA; first record of the order from the western interior of North America. *Zootaxa* 2446:55-64.

## 2010 Publications continued (\* indicates not peer-reviewed)

- Shelley, R.M.** 2010. Rediscovery, redescription, and illustrations of the millipede, *Mitocybe auriportae* Cook & Loomis, 1928 (Colobognatha: Platydesmida: Andrognathidae). *Zootaxa* 2475:39-47.
- McAllister, C.T., & **R.M. Shelley**. 2010. Distribution of *Abacion texense* (Loomis, 1937), the only millipede traversing the Rio Grande, Mississippi, and Pecos rivers (Callipodida: Abacionidae). *Insecta Mundi* 124:1-8.
- \***Starnes, W.C.** and **G.M. Hogue**. 2010. Curation and databasing of voucher specimens from North Carolina Wildlife Resources Commission 1960s. Statewide Surveys of Fishes (with an Analysis of Occurrences). Final Report to NCWRC. 1035 pp.
- \***Starnes, W.C.** and **G.M. Hogue**. 2010. Reevaluation of Status Listings for Jeopardized Fish Species in NC, NC Scientific Council Rept. To NCWRC Nongame Comm., 35 pp
- \***Starnes, W.C.**, and B.H. Tracy. 2010. North Carolina's Imperiled Fish Fauna, Part II. North Carolina Chapter American Fisheries Society December Newsletter: 12-14.
- Stuart, B.L.**, R.H. Bain, S. Phimmachak, and K. Spence. 2010. Phylogenetic systematics of the *Amolops monticola* group (Amphibia: Ranidae), with description of a new species from northwestern Laos. *Herpetologica* 66(1): 52-66.
- Stuart, B.L.**, J.J. L. Rowley, T. Neang, D. A. Emmett, and Som, S. 2010. Significant new records of amphibians and reptiles from Virachey National Park, northeastern Cambodia. *Cambodian Journal of Natural History* 2010(1): 38-47.
- Stuart, B.L.**, S. Phimmachak, N. Sivongxay, and W. G. Robichaud. 2010. A new species in the *Tylototriton asperimus* group (Caudata: Salamandridae) from central Laos. *Zootaxa* 2650: 19-32.
- Rowley, J.J. L., **B.L. Stuart**, T. Neang, and D.A. Emmett. 2010. A new species of *Leptotalax* (Anura: Megophryidae) from northeastern Cambodia. *Zootaxa* 2567: 57-68.
- Rowley, J.J. L., **B.L. Stuart**, S.J. Richards, S. Phimmachak, and N. Sivongxay. 2010. A new species of *Leptotalax* (Anura: Megophryidae) from Laos. *Zootaxa* 2681: 35-46.
- Rowley, J., R. Brown, R. Bain, M. Kusriani, R. Inger, **B. Stuart**, G. Wogan, T. Neang, T. Chan-ard, T.T. Cao, A. Diesmos, D.T. Iskandar, M. Lau, M.T. Leong, S. Makchai, T.Q. Nguyen, and S. Phimmachak. 2010. Impending conservation crisis for Southeast Asian amphibians. *Biology Letters* 6: 336-338.
- Papenfuss, T.J., T.R. Jackman, A.M. Bauer, **B.L. Stuart**, M.D. Robinson, and J.F. Parham. 2010. Phylogenetic relationships among species of Southwest Asian leaf-toed geckos (*Asaccus*). *Proceedings of the California Academy of Sciences* 61 (13): 587-596.
- Bauer, A. M., J. F. Parham, R. M. Brown, **B. L. Stuart**, L. Grismer, T. J. Papenfuss, W. Böhme, J. M. Savage, S. Carranza, J. L. Grismer, P. Wagner, A. Schmitz, N. B. Ananjeva, and R. F. Inger. 2010. Availability of new Bayesian delimited gecko names and the importance of character-based species descriptions. *Proceedings of the Royal Society of London, Series B* (comment).
- Tacker, R.C.**, Lawver, D.R., Douglas, N.K. and Vance, Z.R. 2010. FTIR analysis of irregularly shaped apatite specimens. 2010 Goldschmidt Conference, Knoxville, Tennessee. *Geochimica et Cosmochimica Acta*, 74 (11) Supplement 1, P. A1018. ).
- Tacker, R.C.**, Lawver, D.R., Vance, Z.R. and Douglas, N.K. 2010. Polarized FTIR of B type carbonate in fluorapatite. Abstracts of the 20th General Meeting of the International Mineralogical Association, Budapest, Hungary. *Acta Mineralogica-Petrographica Abstract Series* 6).
- Tacker, R.C.**, Martin, A.J., **Weaver, P.G.** and Lawver, D.R. 2010. Trace vs. body fossil: *Oldhamia recta* revisited. *Precambrian Research*, 178(1-4), p. 43-50).
- Tacker, R.C.** 2010. "Real" hiddenite and real names. *Rocks & Minerals*, 85(3), 264-268.)
- Weaver, P.G.**, Ciampaglio, C.N., Chandler, R.E., 2010. An overview of coleoid cephalopods from the Paleogene and Neogene aged rocks of southern North America. *Ferrantia*, 59: 204-214.
- Weaver, P.G.**, Dockery, D.T. III, Ciampaglio, C.N., 2010. A new genus of coleoid cephalopod from the Jackson Group (Late Eocene), Hinds County, Mississippi. *Palaeontographica Abteilung A*, 292 (1-3): 53-63

## The SECU Daily Planet Takes Shape

A 24-hour celebration of the opening of our new wing, the Nature Research Center, will begin at 5:00 PM April 20, 2012 on Earth Day weekend. As you can see, the SECU Daily Planet is well underway. The keys to the building should be handed to our Museum Director, Dr. Betsy Bennett, in January 2012. It will then take a few months to install the exhibits and get the laboratories and new programs up and running before opening day. There will be lots of activities and entertainment for the entire 24-hour opening so we hope you will join us. We are in the final stage of our fundraising effort. If you would like to make a tax-deductible contribution toward this truly unique museum experience, please contact the Friends of the Museum (919-733-7450 x350) or <http://naturalsciences.org/support-us>.



Construction of the SECU Daily Planet in August 2011 on Jones Street, Raleigh, NC.

KAREN SWAIN