TRANSFORMATION
TRANSFORMATION
You can be a part of the transformation!

The Odum School of Ecology at the University of Georgia became the world’s first stand-alone college of ecology on July 1, 2007. Now we are developing the world’s first living laboratory to house our diverse academic, research and public service and outreach programs. A next generation facility designed from the ground up on the foundation of core ecological science and systems thinking. We are excited to share with you some of our initial work on the new building and invite you to join us in completing our transformation.

**CONCEPT TEAM**
- University of Georgia
- Odum School of Ecology
- BNIM
- Biohabitats
- Supersymmetry
- Vivian Loftness
- Costing Services Group

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THE FUTURE OF ECOLOGY
The Odum School of Ecology is the first stand-alone college of ecology in the world. Many universities have departments of ecology and colleges that focus on the broader field of environmental studies, but the Odum School is the only one specifically devoted to the science of ecology and its immediate applications. The Odum School is recognized as one of the nation’s top programs in ecological sciences based on the strength of its faculty, reputation of its degree programs and international stature.

RESEARCH APPROACH
The school adheres to Eugene P. Odum’s holistic approach to ecological studies, while strengthening and expanding in key areas such as infectious diseases, ecosystem ecology, watershed ecology, evolutionary ecology and sustainability. Researchers in the Odum School work on timely and complex issues, including global climate change, conservation, invasive species and much more.

The School emphasizes an interdisciplinary, collaborative approach to teaching, research and service by integrating expertise and resources from many other schools and colleges at UGA. These include law, forestry, genetics, anthropology, marine biology, economics, and agricultural and medical sciences, as well as public service units such as The Fanning Institute and the Carl Vinson Institute of Government.

EDUCATION
The Odum School offers undergraduate and graduate degrees in ecology, as well as a master’s degree in conservation and sustainable development. In addition, the School offers a Graduate Certificate in Conservation Ecology. Rigorous coursework, interdisciplinary studies, skills in ecological problem solving and vital field experience prepare graduates to secure top jobs such as academic, business, government, non-profits and more.

OUTREACH/POLICY
Public service work is conducted primarily through the School’s River Basin Center. The Center, which is unique among academic institutions, focuses on the connection between land use and water resources. Its interdisciplinary team of scientists and lawyers help communities move from simply identifying environmental problems to developing policies to manage or eliminate those problems. Graduate and undergraduate students are involved in all aspects of the River Basin Center’s work.

INTERNATIONAL REACH
The School expands UGA’s international presence through research programs in other countries. In the area of tropical ecology, key research is conducted at the UGA San Luis Research Station in Costa Rica and the Choco-Andes Corridor in Ecuador in partnership with the Maquipucuna Foundation.
OUR VISION

Our understanding of emerging global economic and environmental issues leads us to forge a sustainable building ethic for the world’s first college-level ecology program—*the Odum School of Ecology*. Our goal is a building that is ecologically resilient, socially just and economically sound.
Envision a world where the earth’s complex living systems are intricately linked and in delicate, harmonious balance with their surroundings. Serving as a model for how natural and built environments will collaborate in the future, the Odum School of Ecology will transform education and research and set an example for a future sustainable society.

The Odum School of Ecology Building will:

• Set a new benchmark as the world’s most sustainable academic lab facility

• Provide a learning environment that transforms education based on the principles of nature’s ability to adapt to changing conditions

• Employ a building system that demonstrates linkages between the ecological systems of water, energy, nutrients, humans and other living systems

• Be a catalyst to attract and retain the highest quality students, faculty and staff devoted to solving the world’s ecological issues

• Foster a collaborative dialogue between academic disciplines and with other institutions about holistic ecological problem-solving

• Embody a function that is living, regenerative, and beautiful
The Odum School of Ecology, founded upon Eugene Odum’s approach for ecosystem ecology, is building a new home that functions as a living laboratory and fosters regenerative symbiotic relationships between humans and natural systems.
The Odum building will be organized by its building “Species”, Laboratory, Office and Collaboration. Each species is then optimized for its individual performance taking advantage of synergies with the entire building ecosystem.
Mimicking nature, the building will operate waste-free by integrating natural systems and adopting and inventing sustainable operating practices that harvest nutrients.

To create change, the building and site will serve as a transparent living laboratory available to everyone.

Embracing ecological diversity, complexity and resiliency, the building and site will allow natural systems to self organize, heal and regenerate ecological processes. This, in turn, will provide food, fiber and shelter for living species including humans.

By encouraging interaction and collaboration, and incorporating the healthiest building practices, this project will create inspiring and healthy indoor and outdoor spaces where people long to work, study and visit.

The building will operate on a carbon neutral basis that demonstrates appropriate demand and supply technologies at various scales.

Occupying a headwater to the Oconee River watershed, the project will celebrate water by conserving and regenerating freshwater cycles, directly linking the building site to the river.

Mimicking nature, the building will operate waste-free by integrating natural systems and adopting and inventing sustainable operating practices that harvest nutrients.
To create change, the building and site will serve as a transparent living laboratory available to everyone.

**POTENTIAL STRATEGIES**

- Integrate curriculum with building and grounds
- Demonstrate most appropriate technology and incorporate into research
- Provide accessible collaboration spaces for all ecology students, staff and outside partners
- Make immediate feedback loops for resource utilization available for conservation education, internal competition
- Set a template for performance improvement over time
- Reward positive behavior change
- Endow a staff position to manage building as a learning laboratory
Balconies in the canopy promote interaction between human activities and the eco-culture of the courtyard

Green roofs serve as living laboratories and demonstration gardens

The stream through the courtyard illustrates the continuity of the watershed to the river

Eco-machines purify black water and serve experimentation in the main entry space

Rooftop photovoltaic panels demonstrate the building's use of renewable energy sources

Green walls provide shade, cool through evapotranspiration and filter views in and out

Sun shades and light shelves articulate the facades and demonstrate the daylighting function of the building skin

Rooftop greenhouse serves as a living laboratory

Sustainable habitats, wetlands, grasslands and stream provide outdoor educational settings

Lawn and ground cover test areas, organic and container farming test areas and demonstration gardens are integrated into the project

“Breathing facades” save energy costs and improve indoor air quality

- Indoor greenhouses and terrariums with regional and tropical habitats, aquariums, compelling soil lab walls for hydrologic processes, indoor eco-machines for wetland ecologies, in a processional that dramatically enriches the building experience.
- Interactive computational study centers are distributed throughout to immerse students in G.I.S. based geo-tracking and geo-infomatics
- Annual updates and the links between eco-systems and climate, population, infectious diseases, crops and crop systems, plant reproduction, etc. will be made publically accessible through Odum’s posters and screen saver series and publicly displayed.
- Rainwater collected from the roof and purified water from the eco-machine feed the stream and is used for on-site irrigation
- A regional/seasonal cafe is located in the main public space
POTENTIAL RESEARCH AREA
OUTDOOR CLASSROOM
ENVIRONMENTAL CLASSROOM

FORESTRY
LIFE SCIENCES

ODUM

DW Brooks Mall
Green Street
HARDMAN
LIFE SCIENCES
FORESTRY
View looking north from Green Street at the south entry, with lawn and ground cover test areas, organic and container farming test areas, and other demonstration gardens in the foreground.

Users who come from the South will enter under a green roof research area and have a direct view of the ecological wastewater treatment system that will be cared for by the students and the faculty.

Left: The existing site area, west to DW Brooks Mall and south to Green St, will be transformed into a series of natural working systems that support Ecology, Forestry and other UGA curricula. New outdoor educational settings - sustainable habitats, wetlands, grasslands, and streams - will demonstrate the power of landscape to restore plant and animal diversity, stream ecologies, watersheds and soils.
Embracing ecological diversity, complexity and resiliency, the project will allow natural systems to **self organize, heal and regenerate** ecological processes. This, in turn, will provide food, fiber and shelter for **living species** including humans.

**POTENTIAL STRATEGIES**
- Make natural resources tangible
- Building acts as part of nature improving natural systems
- Provide a diverse set of plant species for habitat diversity and function
- Create opportunities at all elevations
- Demonstrate agro-forestry, garden, toxicology, lawn study, ground cover study, soil regeneration, organic farming, container farming, wetland, stream, historic restoration
- Stock the café with Ecology School farm resources
- Innovate a new biomimetic product

Site development will support and be respectful of the indigenous species of flora and fauna, expanding the opportunity to provide ongoing education about the importance of biodiversity.
Building Section
Section perspective looking east showing concept ideas for creating a new habitat.

The enriched experience provides extensive green roofs planted in conjunction with lab curriculum to attract desired species; integrated green walls for shading and habitat; and rainwater capture and reuse to develop wetlands, grasslands and streams.
Perspective of the interior courtyard looking east, with the larger trees removed to convey the transparency and connection between the indoor and outdoor learning environments.

Left: An overview of the biodiversity zones going west to DW Brooks Mall and south to Green St. The sensitivity and diversity of developing the site this way offers a more appropriate headwaters condition, increases habitat potential, offers curriculum opportunities and provides readily accessible public demonstration areas.
By encouraging interaction and collaboration and by incorporating the healthiest building practices, this project will create inspiring, healthy indoor and outdoor spaces where people long to work, study and visit.

**POTENTIAL STRATEGIES**

- Incorporate a courtyard that blends inside with outside allowing a place to celebrate and learn
- Promote user control of systems
- Provide access to outside experiences, daylight, natural ventilation, views
- Blend appropriate adjacencies for collaboration and efficiency
- Create and promote integrated environmental art, greenwalls, natural canopies, and waterways
- Partner with campus, community, corporate partners, and government
- Develop a ride share program and discourage single user vehicle use
Interior perspective view of the collaboration corridor, which connects the north and south wings of the building. The collaboration corridor provides gathering spaces for teams of students and faculty to meet both formally and informally. A large window offers daylight and views to the outdoor learning environment.
Cultural amenities
Primary circulation
Environmental classroom

1 Mary Kahrs Warnell Garden
2 Environmental Cafe
3 Auditorium
4 Courtyard

Left: The site of the Odum School of Ecology is at the intersection of two main pedestrian thoroughfares of the University of Georgia Campus. The vision for this gateway connection is to increase the outreach of neighboring schools' work through the experience of the passer-by. Cultural amenities unique to the function of the School of Ecology are readily accessible within the interior courtyard.

Conceptual level building program types are highlighted in rough section sketches and compared by total square foot percentage.
The building will operate on a carbon neutral basis that demonstrates appropriate demand and supply technologies at various scales.

**POTENTIAL STRATEGIES**
- Use identified building species for organizational and building systems development
- Pair conservation and efficiency to set a new low benchmark for energy use in laboratories
- Specify efficient equipment and use conservation features
- Establish operational policies that support responsible use
- Supply enough on-site renewable energy via photovoltaics and biomass to be a net-energy producer on an annual basis
- Provide a 100% daylit building, supported by active shading
- Provide mixed mode ventilation, with preference to natural passive systems
- Reuse traditional waste thermal energy for building thermal needs
Existing Life of Energy for Odum School of Ecology

80% LESS ENERGY

Future Life of Energy for Odum School of Ecology
Natural Daylight
The section perspective (looking east) above shows the advantages of providing orientation to solar south. The building is designed to face solar south, providing the best access to both passive and active strategies available daily from sunlight. 100% of all interior spaces will be naturally daylit. Access to daylight has been shown to increase productivity and accuracy of building users. Use of photovoltaics (solar panels) will be the primary energy source for the school. Solar panels will be located on the roof, on grade and integrated into the building façade and shading devices.
Natural Ventilation
The section perspective (looking East) above shows a design concept of how the two main species of the building lab (left) and office (right) act in natural ventilation mode. Every time the building or a portion of the building operates in natural ventilation mode the Odum School’s impact on the environment is reduced. The office wing uses a double skin facade on the south side and accepts fresh air from the summer dominant WNW winds. Lab research spaces receive air from operable windows on the south side and exhaust air through the filtered mechanical system.
Mechanical Ventilation
The section perspective (looking East) above shows a design concept of how the two main species of the building lab (left) and office (right) act in mechanical ventilation mode. In the office wing uses an underfloor air system, delivering the air where it is needed most. This system lowers air delivery temperature, reducing the energy required for cooling while providing individual control over the airflow and direction. Lab areas use an efficient overhead supply system with a heat exchange recovery wheel on the return side to capture reusable heat as the conditioned air leaves the exhaust stack.

1 Exhaust from labs through heat exchanger
2 Variable frequency air handler served by chiller or boiler
3 Overhead distribution to labs
4 Chiller
5 Pre-chilled water from existing water tank
6 Ground coupling system
7 Fresh air intake passes by green roof through green wall and through heat exchanger
8 Low flow fume hood exhaust system in labs
9 Underfloor air supply
10 Return air used for lab make up air
11 Underfloor air distribution system in offices
12 Interior plants provide natural cooling effect

A ECOL 4010
Earth Sheltered Architecture
Occupying a headwater to the Oconee River watershed, the project will celebrate water by conserving and regenerating freshwater cycles, directly linking the building site to the river.

**POTENTIAL STRATEGIES**
- Conserve with low flow fixtures
- Introduce extensive green roofs
- Capture rainwater and greywater for building use
- Utilize indigenous natural systems
- Demonstrate appropriate technologies
- Treat water on-site via combination of eco-machine and working landscapes
- Eco-machine will be run by students and faculty
- Store excess water in restored oil tank for chiller system heat sink
- Restore currently piped waterway to surface
Existing life of water for Odum School of Ecology

75% REDUCTION

Future life of water for Odum School of Ecology
Left: The project site area straddles a ridge that divides two drainage areas which are both part of the Oconee watershed. Current site design rapidly puts all storm water into pipes sending it away. Environmentally regenerative and restorative techniques at the new site development will create attractive, usable and educational habitat zones along the exposed waterways.

As pedestrians turn east off of DW Brooks Mall they will experience a more natural set of surroundings including a natural streambed flowing from the Odum School of Ecology courtyard.
Water Systems
The above section perspective (looking east) showcases how the building fabric can be a source of fresh water and uses every drop at least twice. The building will manifest the highest level of water conservation possible for building type and location. In addition to capturing rain water, it will recapture grey water and black water through the eco-machine, ensuring the lowest water use with the highest ecological richness.
Mimicking nature, the building will operate waste-free by integrating natural systems and adopting and inventing sustainable operating practices that harvest nutrients.

**POTENTIAL STRATEGIES**

- Create a system for zero waste
- Eco-machine for blackwater run by the students and faculty
- Select only environmentally preferred building material products based on a systems approach
- Eliminate any applied materials
- Harvest materials from existing Ecology School building
- Develop cradle-to-cradle operational practices for materials and products
- Compost all cafe products
- Offset any negative environmental impacts
Material Narrative

GOALS
The Odum School of Ecology will showcase how materials and assemblies in the building fabric can be integrated into the curriculum. The opportunities are significant, regional materials with high agricultural and forestry content, natural materials and assemblies with high recycled content, low outgassing, no waste, and long life through cherishable craftsmanship and design for disassembly. Cradle to cradle decision making will be pursued, with a visionary pursuit of biomimetic innovations from self cleaning to breathing facades with zero net energy, zero net water, zero net waste.

CRITERIA FOR MATERIAL SELECTION
Criteria for sustainable material selection for the project could include the following. The order of importance or weighting of the criteria should be discussed further as a project team.

Energy and Water Use in the Building
Does the product or assembly reduce the energy and water consumption of the building over its lifetime?

Environmental and Human Health Systems
Does the product or assembly throughout its lifecycle reduce the negative impact on life-support systems?

Occupant Well-being
Does the product or assembly eliminate hazards to indoor air quality, while improving indoor environmental quality and occupant wellbeing?

Durability, Performance and Maintenance
Does the product or assembly perform its intended function elegantly for at least 100 years?

Recycled Content
Is the product or assembly produced with recycled material stock reducing the demand for virgin raw materials?

Resource Limitation
Is the product or assembly made from materials that are rapidly renewable or are they rare and endangered?

Waste Management
Is the product or assembly produced in a way that limits the generation of solid waste and is the material itself reusable or recyclable at the end of its useful life in the building?
FIRST STEPS TOWARDS TRANSFORMATION
Potential Biomimics

According to the Biomimicry Guild, biomimicry is an innovation method that emulates nature’s sustainable solutions of time-tested patterns and strategies, e.g., a solar cell inspired by a leaf. The goal is to create products, processes, and policies—new ways of living—that are well-adapted to life on earth over the long haul.

In the concept design phase we identified some potential biomimics. As we move into the next phase of design more will be identified and then selected for emulation as either a product, process or policy.

- **FIRE ANT**
  A community pioneer that creates better soil, via aeration, to enable prairie succession, and may also directly benefit certain plants

- **BARK OF PIEDMONT FOREST HARDWOOD SPECIES**
  Ability to protect the tree from small fires and other fauna species

- **NATURE’S ECOSYSTEM**
  Abundant energy, water conservation, succession, resiliency, habitat creation and sustenance, zero waste

- **DIVERSITY AND SUCCESSION OF PIEDMONT FOREST**
  Poly-culture of species aiding and succeeding together during different timeframes. Design for change

- **VISUAL FEEDBACK**
  Wilting of plants, sprouting of new stalks when damaged

- **PIEDMONT DENSITY AND OPENNESS**
  Tall dense and low open spaces (discovered during ecology students historical investigation)

- **ELEVATIONS OF THE PIEDMONT**
  There is a great elevation change in the region that can be incorporated into the design ideas as can the ecologies in those elevation changes (idea from ecology students)

- **GRANITES**
  One of the prominent geological formations in the region

- **THE PIEDMONT FALL LINE**
  Look at this as a mimic for entry and passage (idea from ecology students)

- **NATIVE VINES**
  Students suggest this plant species should be utilized for passive cooling on the building (less of a mimic, but more of a direct interpretation)

- **FIRE**
  This played a huge role in the ecological change in the region, both Native American and natural fires
Climate Chart
ATHENS, GEORGIA

Understanding the climate of the area you inhabit is paramount to success for many things including building design. This climate chart depicts the basics of our natural system which have an affect on how we design, construct, operate and use our built environments.
Average wind speed

Wind speed averages in Athens remain consistent throughout the year with spring bringing slightly higher gusts. The spring and summer months of May, June, and July, with south winds and warmer temperatures, offer times when natural ventilation can be used to cool buildings and offer fresh air. Harvesting wind energy is a viable option.

ECOSYSTEMS

Indigenous plant and animal species

Forbs and Wildflowers
- Ashy Sunflower
- Black Eyed Susan
- Blanket Flower
- Butterfly Milkweed
- Compass Plant
- Plains Larkspur
- Heath Aster
- Narrow Leaf Ironweed
- Indian Paint Brush
- New England Aster
- Prairie Coneflower
- Curled Dock
- Purple Prairie Clover
- Rocky Mountain
- Zinnia
- Rose Verbena
- Spiderwort
- Stiff Goldenrod
- Tickseed Gayfeather
- Big Flower Coreopsis
- Wild Hyacinth
- White Beardtongue
- White Wild Indigo

Grasses and Sedges
- Big Bluestem
- Blue Grama
- Bottlebrush Sedge
- Buffalo Grass
- Bur Reav Sedge
- Bushes Sedge
- Canada Wild Rye
- Fox Sedge
- Great Plains Sedge
- Good Mangrass
- Indian Grass
- Least Sedges
- Little Bluestem
- Prairie Cordgrass
- Prairie Dropseed
- Porcupine Sedge
- Rattlesnake Grass
- Rice Cutgrass
- Side-Oats Grama
- South Grass
- Common Sorrel
- Rush
- Sharp

Shrubs and Trees
- Ash
- Baldcypress
- Basswood
- Birch
- Brook
- Butternut
- Catalpa
- Cedar
- Cherry
- Chestnut
- Cottonwood
- Dogwood
- Elm
- Hawthorn
- Hemlock
- Hickory
- Locust
- Magnolia
- Oak
- Pine
- Persimmon
- Redbud
- Sassafras
- Silverbell
- Sycamore
- Tuliptree
- Walnut
- Willow

Wildlife
- American Alligator
- American Beaver
- American Black Bear
- American Toad
- Bald Eagle
- Barn Owl
- Bobcat
- Brown Pelican
- Bullfrog
- Cedar Waxwing
- Copperhead
- Crayfish
- Eastern Box Turtle
- Eastern Cottontail
- Eastern Fence Lizard
- Eastern Meadowlark
- Eastern Nighthawk
- Eastern Red Bat
- Golden-winged Warbler
- Great Egret
- Mourning Dove
- Nine-banded Armadillo
- Northern River Otter
- Nuthatch
- Purple Martin
- Rat Snake
- Red Fox
- Round-tailed Skink
- Spotted Salamander
- White-tailed Deer
- Wild Pig
- Wild Turkey
- Wood Duck
Intuitive Ideas

50% concept plan summary from Design Workshop One showing adjacency to neighbors, site curriculum integration, passive orientation, redevelopment of streambeds and preservation of diagonal pedestrian circulation to DW Brooks Mall.

Initial study of macro climate conditions for solar orientation and annual wind directions.

Concept strategy diagrams for major organizing features of the building focused on material and energy resource efficiency.
Source Cooling Loads

A major source of heating and cooling loads not shown above is the lab exhaust volume. For this study we assumed an exhaust volume of 10,000 cfm. The cooling load increases one ton for every 300 cfm of exhaust in this climate.

Source Heating Loads

The pie chart below shows what percent of the heating load is contributed by each building element in the day lighting (best) case.

The high infiltration load is caused by high population (725). When this number is adjusted downward, this number will reduce.

Daylight Potential and shading Studies

Scientific Studies
The Odum School of Ecology “living laboratory” is to be an example of sound economics that expresses the fundamental balance of investing for the long term while addressing the needs for the school today.

The chart below shows a life cycle cost analysis of the “living laboratory” compared to two others. One a typical lab building that is not designed to its specific environment and the other a lab building that has been designed to work within the same climate as the “living laboratory” using standard energy systems.

The preliminary first cost for the Odum Living laboratory is estimated to be $93,000,000. Over the life of the building, this initial investment in regenerative design strategies will keep total building expenditures extremely low relative to standard design options show below.
If you would like to **be part of the transformation**, here are some unique opportunities.

<table>
<thead>
<tr>
<th>Project</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Photovoltaic Panels 100% Offset</td>
<td>$$$</td>
</tr>
<tr>
<td>Automated Daylight Tracking System</td>
<td>$$</td>
</tr>
<tr>
<td>Automated Natural Ventilation Controls</td>
<td>$$</td>
</tr>
<tr>
<td>High Efficiency Lab Equipment</td>
<td>$$</td>
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<tr>
<td>Entry Lobby Exhibit</td>
<td>$$</td>
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<tr>
<td>Greenhouse</td>
<td>$$</td>
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<tr>
<td>Ecological Café</td>
<td>$$</td>
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<tr>
<td>Oil Reserve Tank to Geothermal Water Tank Conversion</td>
<td>$$</td>
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<tr>
<td>Ecological Waste Water Treatment System</td>
<td>$$</td>
</tr>
<tr>
<td>Faculty Offices</td>
<td>$</td>
</tr>
<tr>
<td>Outdoor Classrooms</td>
<td>$$</td>
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<tr>
<td>Primary Lecture Hall or Secondary Lecture Hall</td>
<td>$$</td>
</tr>
<tr>
<td>Student Lounge</td>
<td>$</td>
</tr>
<tr>
<td>Perma Culture Garden</td>
<td>$$</td>
</tr>
<tr>
<td>Student Carrels</td>
<td>$$</td>
</tr>
<tr>
<td>Full Time Building Systems Coordinator and Educator</td>
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</tr>
</tbody>
</table>
Be a part of this historical transformation!

The Odum School’s new home will inspire all who pass through. It will provide a living example of the work, study, and health benefits of daily interactions with the natural environment. It will demonstrate the feasibility of renewable technologies and the effectiveness of water conservation and reuse. Not only will the structure serve as a home and laboratory to the Odum School, the first stand-alone college of ecology in the world, but as a benchmark for sustainable design world-wide. Others will follow our lead, and generations of students, legislators, industry leaders, and schoolchildren will remember the start of a new era at the University of Georgia.

Join us as we plan and construct the world’s first living laboratory. Your commitment of time, resources, and ideas will establish an inestimable legacy.
A human being is part of a whole, called by us the universe, a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest—a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and to affection for a few persons nearest us. Our task must be to free ourselves from this prison by widening our circles of compassion to embrace all living creatures and the whole of nature in its beauty.

- Albert Einstein