



The *Greening*
of MUSC

ANNUAL REPORT 2011-2012

On the cover:

A foxglove grows in the Porcher Medicinal Garden, one of the many varieties of flowering plants that flourish at MUSC.

The *Greening* of MUSC

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“It is your human environment that makes climate.”

—Pudd'nhead Wilson's New Calendar
Following the Equator
Mark Twain, 1897

In 1969, the Cuyahoga River in northeastern Ohio caught fire. It wasn't the first time, but, thankfully, it was the last. So polluted and bereft of life, the river at that time was one in which a man “does not drown but decays,” according to *Time* magazine. That incident helped to spur several environmental initiatives, including the Clean Water Act and the establishment of the Environmental Protection Agency.

The following year, the first Earth Day was celebrated, and it's safe to say America is a much cleaner country now than it was in 1970. This is not to say, however, that all our air is fresh and our waters pristine – far from it. Environmental issues remain with us today, and probably always will. The argument over climate change and global warming rages on.

In terms of human health, however, simple truths prevail: fresh air is better than polluted air; clean water is better than polluted water; a diet consisting of fruits, vegetables, grains and other recommended components is better than one loaded with fats, sugars and the like. None of this is new, of course, but it may

take on more urgency as the amount of industrial chemicals we produce and import continues to increase. A few years ago, a survey by the Centers for Disease Control and Prevention found traces of 212 environmental chemicals in Americans, many of them toxic.

In this era of technological “upgrades,” we at the Medical University of South Carolina strive to upgrade our standard of living, beginning at home. Here, in the heart of the Holy City that is Charleston, you'll find on our campus an increasing emphasis on recycling and sustainability. Under the shade of a magnificent live oak you'll see the results of the “sweat equity” that goes into our half-acre Urban Farm. And, of course, our world-class scientists and clinicians continue to study the effects of the environment on our own well-being.

I am constantly in awe of the good works going on at MUSC at all levels, from the grounds crew to the health care providers to the researchers in their labs. I hope you are, too.

Thomas L. Stephenson
Chair, Board of Trustees



Dear Friends:

One of the great benefits of working or studying at the Medical University of South Carolina is to be able to live in one of the most beautiful natural environments in the world. Within minutes of our campus, one can visit rivers, tidal marshes, beautiful beaches,

working farms, and much more. It is not surprising, therefore, that folks here take our surroundings very seriously and have an abiding interest in how our health is affected by our environment.

In the following pages, you will read about some of the work that is going on at the Medical University in relation to the environment on campus and beyond. Over the past few years, we have made a genuine commitment to “greening” our campus. We are trying to manage our operations in an environmentally sustainable way – from the design, construction and operation of our buildings, to improving our energy efficiency, to recycling our waste products.

We are also working hard to have the green space on our campus be just as educational as what transpires in our laboratories and classrooms. Former medical school dean Jerry Reves and a dedicated team of individuals coordinated by arborist Nate Dubosh have secured certification of our campus as an arboretum. Susan Hoffius, the director of the Waring Library, and colleagues have created a medicinal garden that provides a living tribute to

the landmark work of the Medical University's nineteenth century faculty member, Dr. Francis Peyre Porcher.

Through generous support of Sodexo and other private donors, we have created an urban farm on our campus, where fresh fruits and vegetables are grown for consumption in our hospitals and by those who work here and with our neighbors in need. The farm is an educational resource for teaching about nutrition, and it is also a place in which students, faculty and staff can get some physical exercise and stress management.

As a research university, we are also committed to advancing the knowledge base about the interactions between the environment and health. Dr. Lou Guillet's award winning work, for example, has demonstrated that environmental toxins, such as hormone disrupters, can adversely affect reproduction in the wild. To the extent that the effects in these species serve as sentinels for affects in humans, it is important that we advance our understanding of these issues even further.

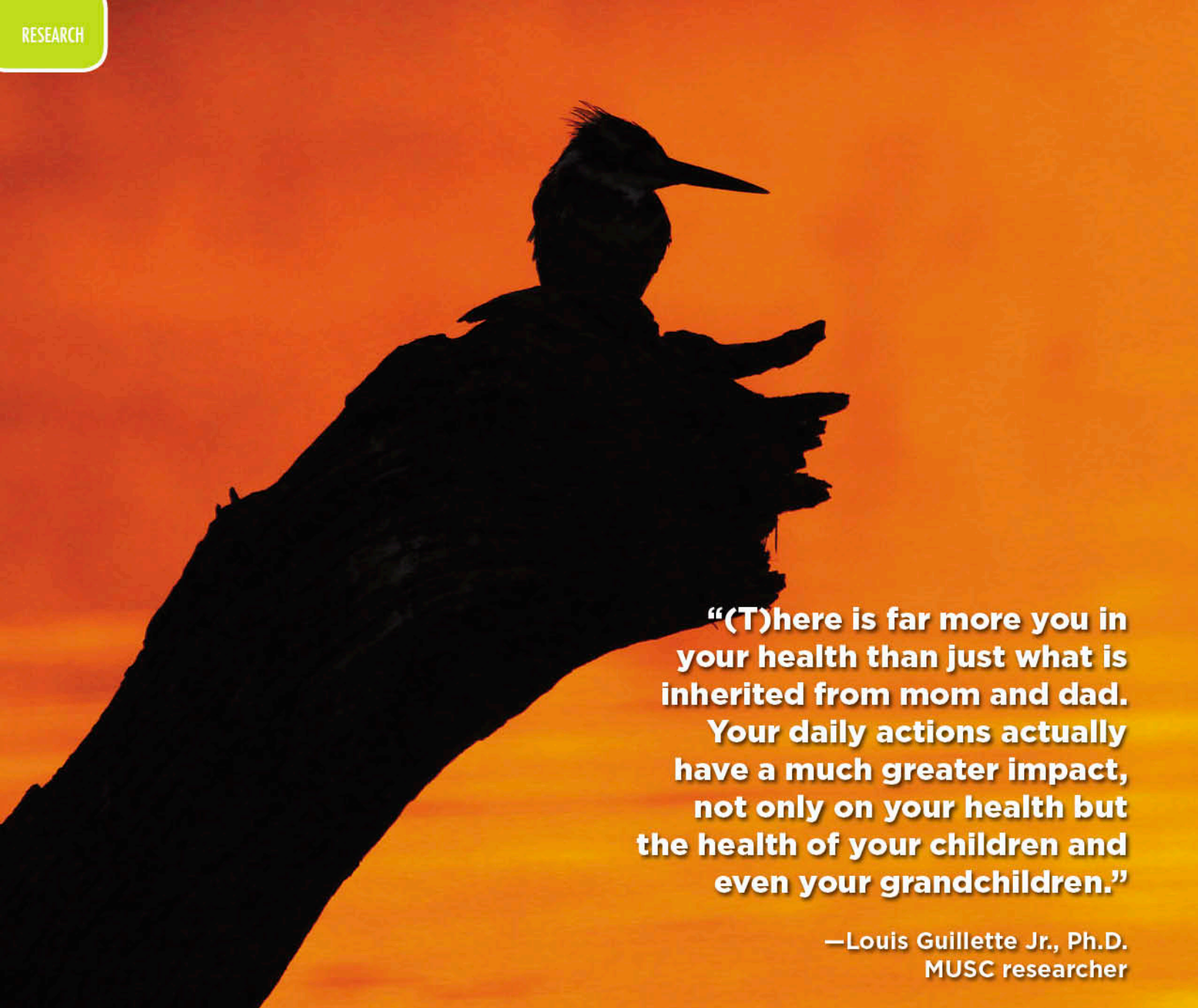
We hope that through these and many other efforts we are taking a small step forward as stewards of our environment. It is a responsibility that goes hand-in-hand with the privilege of calling this beautiful place our home. We hope that it will inspire others and in the process provide a healthier environment for generations to come.

With best wishes,

Raymond S. Greenberg, MD, PhD
President

RESEARCH

Lessons
from the
Water's
Edge



“(T)here is far more you in your health than just what is inherited from mom and dad. Your daily actions actually have a much greater impact, not only on your health but the health of your children and even your grandchildren.”

—Louis Guillette Jr., Ph.D.
MUSC researcher

On the surface, crocodiles in the renowned Kruger National Park and the oil spill along America’s Gulf Coast may not seem to have much in common — unless you’re MUSC researcher Louis J. Guillette Jr., Ph.D.

The reproductive endocrinologist and developmental geneticist is involved in studies in both regions to figure how chemicals and contaminants interact with the environment in ways that impact human health. His research is confirming just how dramatic and far reaching these impacts can be.

That’s a subject Guillette, director of the Marine Biomedicine & Environmental Sciences Center, explores in a reflective piece published in *Science* magazine titled “Life in a Contaminated World,” (www.sciencemag.org/content/337/6102/1614.summary)

The article commemorates the 50th anniversary of Rachel

Carson’s book, “*Silent Spring*,” that challenged thinking that up until the early 1960s saw pesticide use as simply a benefit to agriculture and public health with few detrimental consequences. Guillette observes in the article that the book was the start of a debate that continues to this day on the relative benefits and risks of not just pesticides but of all synthetic chemicals.

His goal: To get researchers, doctors and the public asking the right questions.

“It’s time. A revolution is taking place. The new realization is that your health is a combination of what you inherited from mom and dad, but also the environment you saw from the day you were conceived. It’s no longer diseasecentric in that you have a mutation and it’s a predisposition for disease,” he says, adding that a person’s diet and lifestyle, level of stress and exposure to chemicals that act as endocrine disruptors all could be factors leading to such conditions as diabetes, obesity, cancer or infertility.

“It’s not just your genes. The idea is there is far more you in

On the Trail of Rachel Carson



LJG'12

your health than just what is inherited from mom and dad. Your daily actions actually have a much greater impact, not only on your health but the health of your children and even your grandchildren. This potentially has a multi-generational effect.”

The reason Guillette is so passionate and gives dozens of public health talks every year is that he sees the impact of how chemicals and environmental contaminants can mimic hormones and act as endocrine disrupters.


Endocrine disruptors can create issues from infertility to obesity by mimicking the actions of naturally occurring hormones in the body or preventing the hormones produced. An example is how the liver handles excretion. Researchers are studying compounds that act as obesogens that encourage the body to store fat and re-program cells to become fat cells or the liver to become insulin resistant.

In his wildlife biology research for the past 20 years, Guillette has found infertility and reproductive issues in alligator popu-





“It’s not just great science we’re proposing, but it is also the setting that provides us a step up compared to lots of places. We have this unique community that we have built and continue to build. It validates the marine biomedicine model we have of having a medical school partnering with NOAA and NIST and world-class analytical chemists and biologists.”



lations from Florida to South Carolina. Mammals use hormones that are identical to what reptiles use, which is why alligators and crocodiles serve as typical research subjects for Guillette as sentinel species to study environmental impacts on human health.

Into The Wild

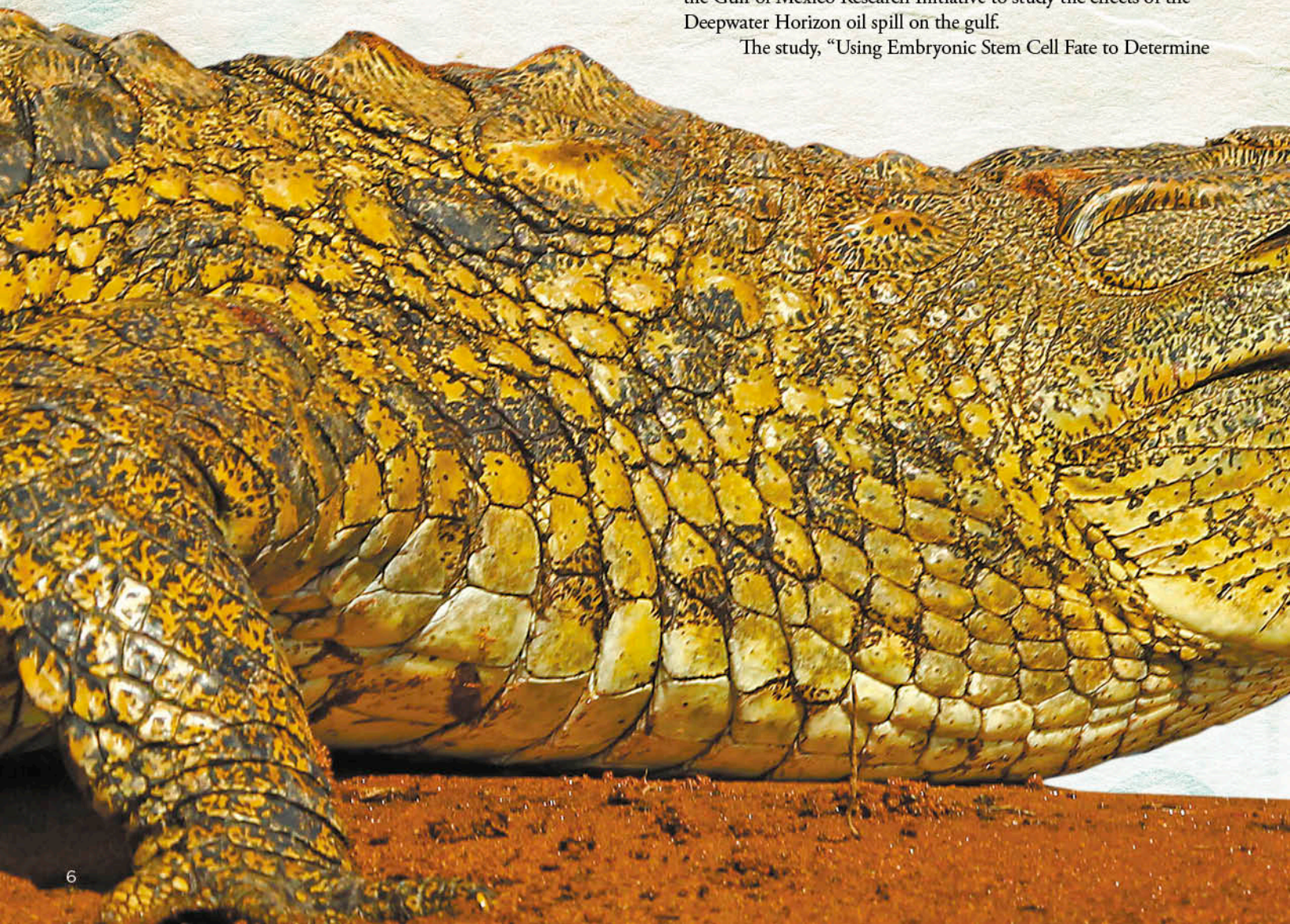
Guillette was asked to go to South Africa to Kruger National Park to examine why almost half of the crocodile population there has died off in the past two and a half years. He went in September for a couple of weeks to catch and test crocodiles, getting chased by hippopotamuses and driving through maternity herds of elephants.

“You would come around a bend and there would be a lion. It’s like being in Africa 100 years ago,” he says.

It was, except that this area is a low-lying drainage basin and the crocodiles are in trouble, as well as catfish. “I do know crocodilians, and there are some things that don’t measure up. Something is going on. The park is an environmental wonderland, a place that people come from all over the world to visit. It resembles New Orleans as far as environmental problems in that it’s a low-lying area susceptible to contaminants that are transported in rivers from all over the country.”

Guillette says the initial four-year study in South Africa will be an interesting collaboration, as will be the three-year BP trust fund-sponsored Gulf of Mexico research grant. Guillette and colleagues Demetri D. Spyropoulos, Ph.D., Satomi Kohno, Ph.D., and John E. Baatz, Ph.D., landed a \$1.2 million grant from the Gulf of Mexico Research Initiative to study the effects of the Deepwater Horizon oil spill on the gulf.

The study, “Using Embryonic Stem Cell Fate to Determine




Potential Adverse Effects of Petroleum/Dispersant Exposure,” involves the latest in innovative testing methods that takes advantage of where the researchers have set up shop. Although the Hollings Marine Laboratory is a National Oceanic and Atmospheric Administration (NOAA)-administered facility, it is a fully cooperative enterprise with activities governed by the five partner organizations that include MUSC and the National Institute of Standards and Technology (NIST).

“It’s not just great science we’re proposing, but it is also the setting that provides us a step up compared to lots of places. We have this unique community that we have built and continue to build. It validates the marine biomedicine model we have of having a medical school partnering with NOAA and NIST and world-class analytical chemists and biologists.”

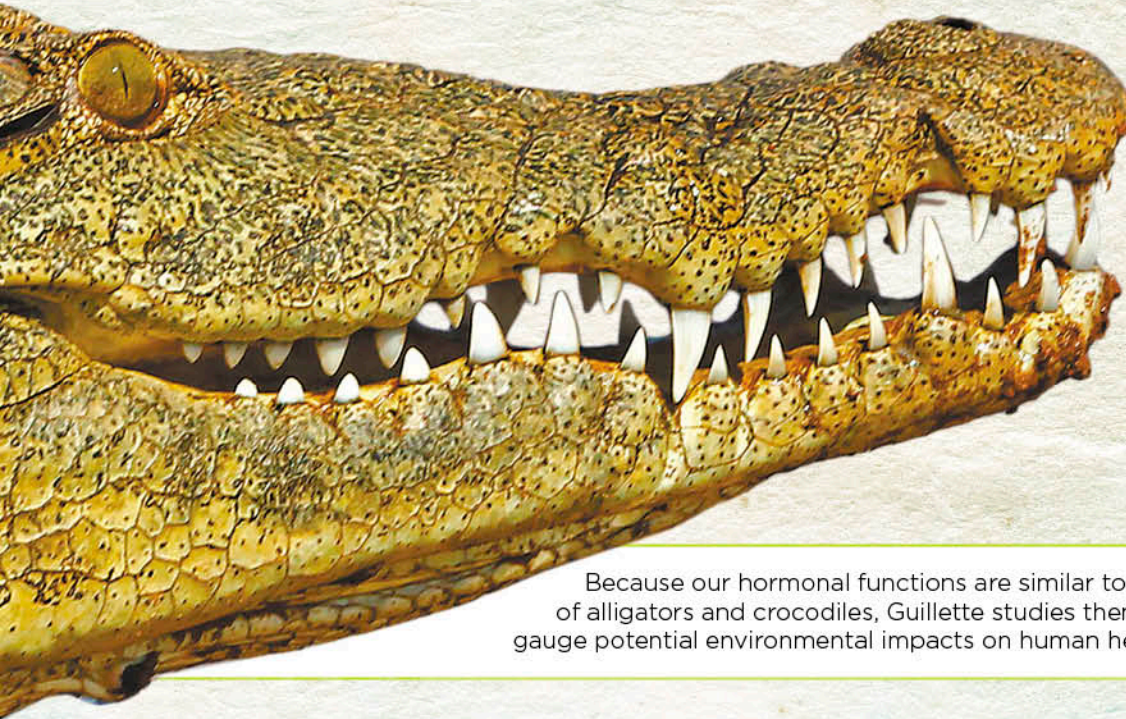

Into the Lab

Guillette and colleagues have worked extensively for years trying to find out how environmental contaminants and native hormones influence gene expression via steroid receptors – acting as mimics of estrogen, progesterone and testosterone. The question was how to screen chemicals, in this case the petroleum and dispersant chemicals, in a way to avoid testing a wide array of wild animals.

Fortunately, together with Spyropoulos, Kohno and Baatz, they had insights based on their research programs that could contribute a new approach to testing environmental chemicals. They’ve developed a technique that can take the estrogen or progesterone receptors from the more than 40 marine animals that have been cloned and put it into a cell with a reporter construct so that when researchers add a chemical, it binds to the receptor, says Guillette.



“It’s not just your genes. The idea is there is far more you in your health than just what is inherited from mom and dad. Your daily actions actually have a much greater impact, not only on your health but the health of your children and even your grandchildren. This potentially has a multi-generational effect.”



Because our hormonal functions are similar to those of alligators and crocodiles, Guillette studies them to gauge potential environmental impacts on human health.



“The hope is that although the projects are solicited as individual investigator-driven projects, by sharing this information, we are building a community that is interested in finding out what’s going on. We can start to get some idea about whether we should be concerned and where we need to do more work.”

“That is translated to the reporter, binds to the reporter and turns on a gene and the cell glows, and it does it in a dose-dependent fashion. Now you can say this chemical can be an estrogen or a progesterone or whatever, and determine the dose. It lets us know we now have an active compound to study.”

Spyropoulos and Baatz also have been able to harvest lung cells from pygmy sperm whales and make inducible pluripotent stem cells where they took lung cells and “drove them backwards developmentally.” Guillette says they’ll be able to take aged oil or whatever substance they’re studying and test it on cells to see if it changes the developmental process, so instead of stimulating muscle cell growth, the treated cell becomes a fat cell, for example.

“There’s a whole world out there we realize of compounds called obesogens. These are chemicals that in the developing embryo instead of stimulating the production of muscle or fibroblast cells, it actually stimulates more fat cells. The chemicals and contaminants in the diet during embryonic development may be programming that body to store more fat.”

The Gulf of Mexico research initiative received 629 applications and MUSC was one of 19 chosen. The initiative is helping to build a portfolio of top scientists who are working together.

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There are several chemicals that are common, such as BPA found in plastics and tri-butyl-tin found near harbors around the world, that have been suggested to have obesogenic activity. Guillette says their BP study can’t answer everything, but they know how to be selective in their focus to find those chemicals that do disrupt endocrine cycles.

“We know that obesogens are a critical component and that things like estrogens and androgens are critical for long-term

and short-term fertility. We know that glucocorticoids or stress hormones are associated with inflammation and immune function. We can take human glucocorticoid receptors, whale and alligator and fish glucocorticoid, and line them up in different cells and test the chemicals all at the same time. Then we can see if the chemical potentially interacts with the receptor that is associated with stress and immune function, and we can also test if it goes across species.”

The Carson Connection

Their work builds on what Rachel Carson believed decades ago, even without the scientific testing methods that researchers have today. If Carson were alive today, he’d like to tell her thank you and that she was right. He’s proud to be following in her footsteps.

“If I told you that in a week you’re going to get 2,000 chemicals in your body that your grandparents never had in their body, and we have no idea what the health consequences are, and not just in you – it’s in your kids too. Would you think that was good?”

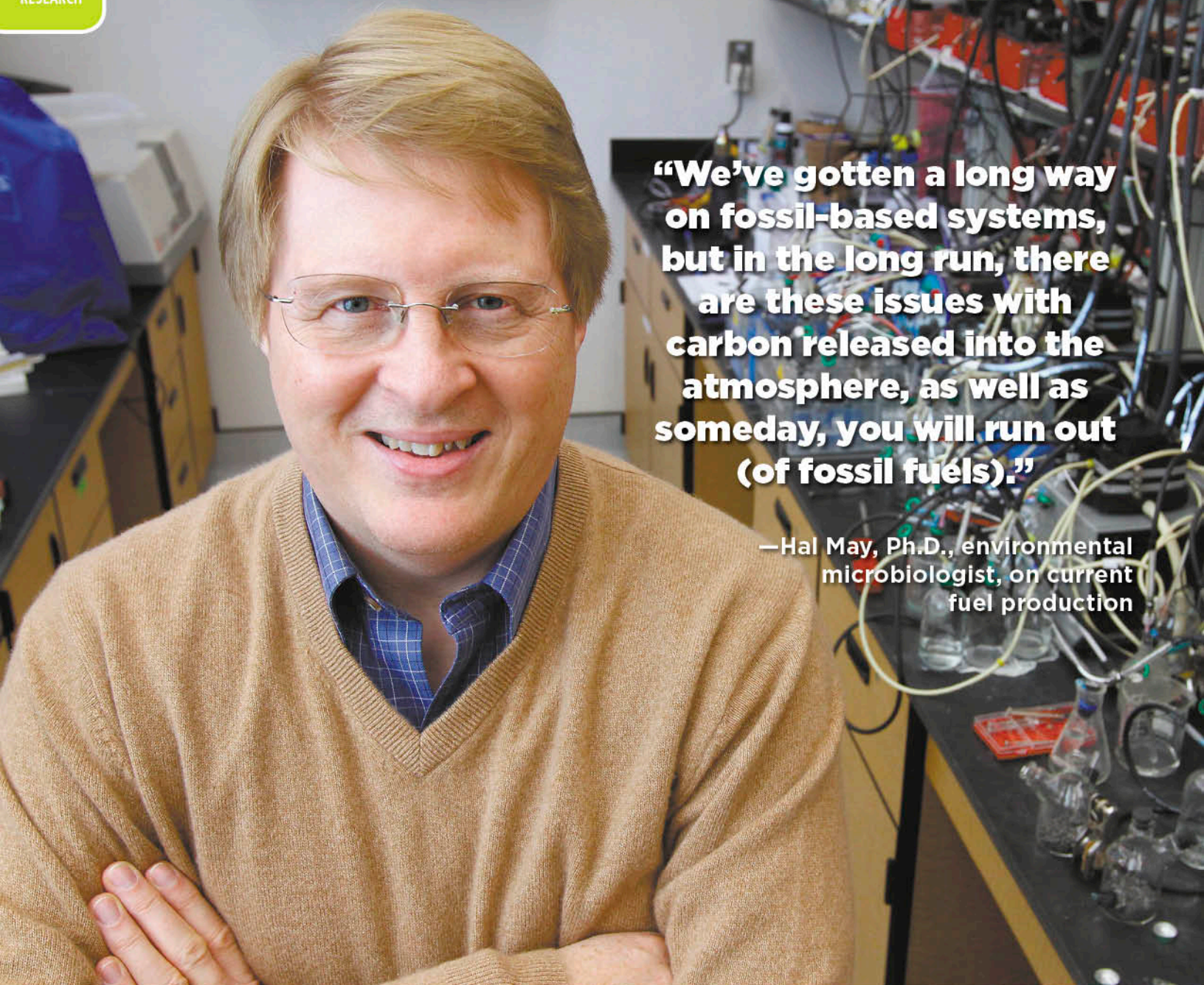
The revolution happening is that scientists from critical disciplines are joining forces to change the way this game is played, he says.

“We’re coming together to say as biologists, as health professionals, as chemists, we need to start working together. Chemists need to start taking toxicology and health classes, and biologists need to start working with chemists.”

It’s an immense undertaking and one still surrounded in controversy, but Guillette sees the science winning out.

“We’re supposed to be bright people. We’re supposed to be leaders in the world in innovation. Let’s start innovating. And you know what? There’s money in that. There’s real money in that because a proprietary chemical is always going to make you more money than something that’s 50 years old. If that’s your vested interest, that’s fine. For me, I just want healthy kids.”

Guillette says biologist-author Carson was right about the dangers of synthetic chemical pesticides.



“We’ve gotten a long way on fossil-based systems, but in the long run, there are these issues with carbon released into the atmosphere, as well as someday, you will run out (of fossil fuels).”

—Hal May, Ph.D., environmental microbiologist, on current fuel production

Hal May needs a microscope to see his workmates, but wonders if eventually it will take an environment as large as an ocean to reach their potential.

In his lab at the Hollings Marine Laboratory at Fort Johnson on Charleston Harbor, May and his staff have found methods to induce microbes to produce various chemicals and fuels that eventually could have commercial value, and do it at minimal cost in a relatively new process called microbial electrosynthesis. With this process, electricity is used as an energy source to feed microbes and stimulate them into producing a variety of organic compounds.

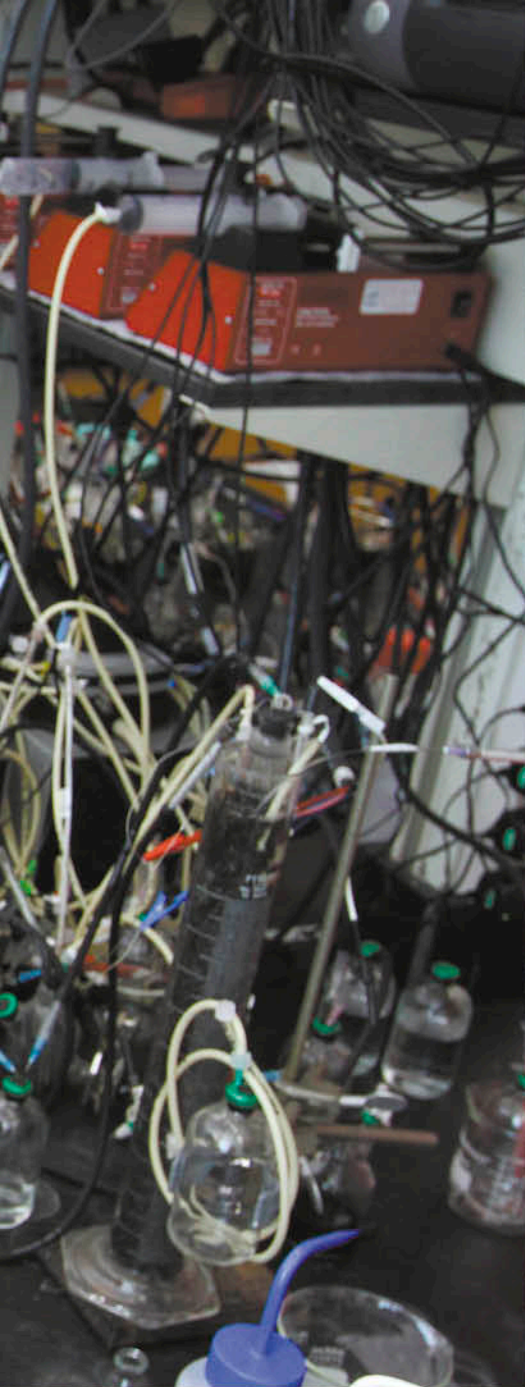
“You take electricity, carbon dioxide, water, and microbes, and you say ‘make something’ which also means they have to make a living out of this,” he says. “The electricity is their energy source. We all have

to have an energy source—their is electricity. We all have to have a carbon source—their carbon source is carbon dioxide.”

May, an environmental microbiologist with a PhD from Virginia Tech, initially succeeded in getting microbes to generate electrical current, but eventually concentrated on feeding electricity to microbes to make other products.

This project came in response to an initiative from the US Department of Energy’s Advanced Research Projects Agency (ARPA), seeking innovative shortcuts to make chemicals and fuels from carbon dioxide. “We don’t want to use fossil fuels and we don’t want to use photosynthesis. We just want to make it straight up from carbon dioxide,” May recalls the DOE’s directive, “which was a bit of a tall order.”

“So I proposed (that) you could put an electrode in (with microbes) and that could be the energy source for these things. The reason I proposed that because I knew the reverse was true. We can make electricity in an electrode with microbes, but can we get microbes to consume electricity in an electrode, just turn the process



Microbes and the Future of Fuel Production



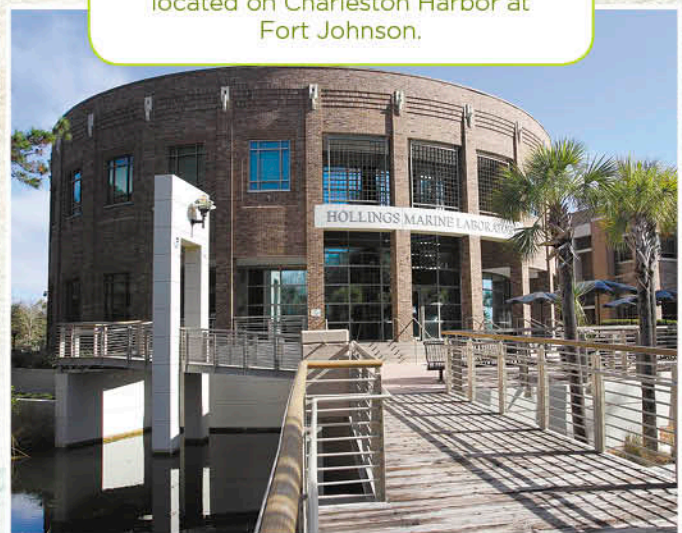
Hal May, PhD, with his microbes in his lab at the Hollings Marine Laboratory located on Charleston Harbor at Fort Johnson.


around. That was the basis of my hypothesis,” May explains.

Microbes can be found practically everywhere – in the air, ground, water and in living creatures, and they can thrive in dramatically different environments. May and his research assistants made an extensive search looking for the right microbes, and found the best candidates in a cistern behind a local beer brewery.


“Of all the different sources we’ve been using, that’s the one that worked,” May says. “Different stages of fermentation and different types of fermentation. In the end, all of that gets washed out of the tanks and goes into a cistern at the back of the building as a pretreatment before they can release it legally into the Charleston wastewater system. You would expect most of what is in there: a bunch of yeast, leftover sugars, alcohol, vitamins, a few other intermediate fermentation items. That all goes back in the cistern and becomes an even bigger, nastier brew.

“It’s not sterile, of course. They don’t want it to be sterile. They want it to consume as much waste as possible before it goes into the





“The electricity is their energy source. We all have to have an energy source – theirs is electricity. We all have to have a carbon source – their carbon source is carbon dioxide.”



wastewater treatment system. From a microbiology standpoint, that’s wonderful. That means you have a very happy, active population of microorganisms that you feed every day, and they’ve been feeding them for years. So that means you’ve got them well adapted to do whatever crazy things they’re doing in there.”

On a rainy day, May and his research assistants collected a batch of the brewery’s tiny inhabitants and brought them back to his lab. Fortunately, for May anyway, they had traveled in separate vehicles to the brewery, and he chose to let the students bring the microbes back with them, “because you don’t want to smell your car for a week after that stuff’s been in there.”

From there, it was a matter of configuring the microbes to become proficient at their task by adjusting the amount of voltage to use, proper temperature and pH, and how much carbon dioxide to give them, among other factors.

Eventually, May and his staff begin to observe the brewery microbes drawing noticeable amounts of electric current. “That told us something was off to the races,” he says.

Microbes, it turns out, are capable of producing a variety of organic compounds. “It’s how we discovered antibiotics, microbes producing antibiotics and antibiotics are pretty complex molecules,” May explains. “The microbial world has a tremendous capability to make lots of different compounds, from anything to plastic precursors to fuels to drugs.”

What May’s microbes have produced so far primarily are hydrogen, acetic acid and methane. Potentially, several other compounds could be produced, many of them with commercial applications, although May says that stage is a long way off. “If we can produce hydrogen acetate, theoretically you could then make ethanol from that. If you can make hydrogen and butyrate, theoretically you could make butanol. Each of those could be a fuel. You could even convert some products into bioplastics,” he says.

Acetic acid, for example, already has a huge market in the production of polymers, paints and plastics. The same goes for hydrogen, which can be used as a fuel or as an ingredient in other products.


Then there is the sustainability factor. May’s lab uses nothing more than electric current and carbon dioxide to get results. Nothing else, at least at this stage, is needed, making it extremely cost-effective. In fact, based on a hypothetical rate of five cents per kilowatt-hour, May’s lab can produce 60 cents worth of acetic acid with only 35 cents of electricity.

“We’ve gotten a long way on fossil-based systems, but in the long run, there are these issues with carbon released into the atmosphere,” May says about current production methods, “as well as someday, you will run out (of fossil fuels).”


The challenge, of course, is to produce a high enough volume of these compounds to make them commercially viable. May has broached that subject with some engineering firms to explore the possibility. Eventually, the solution may be only a short distance from his Fort Johnson location – the Atlantic Ocean.

“The ocean is gargantuan and captures CO₂ more so than fresh water” he explains. “If you could build a reactor and use marine water, you could use the CO₂ from the ocean and convert it into a useful chemical. I want to see if we can leverage the ocean for this.”

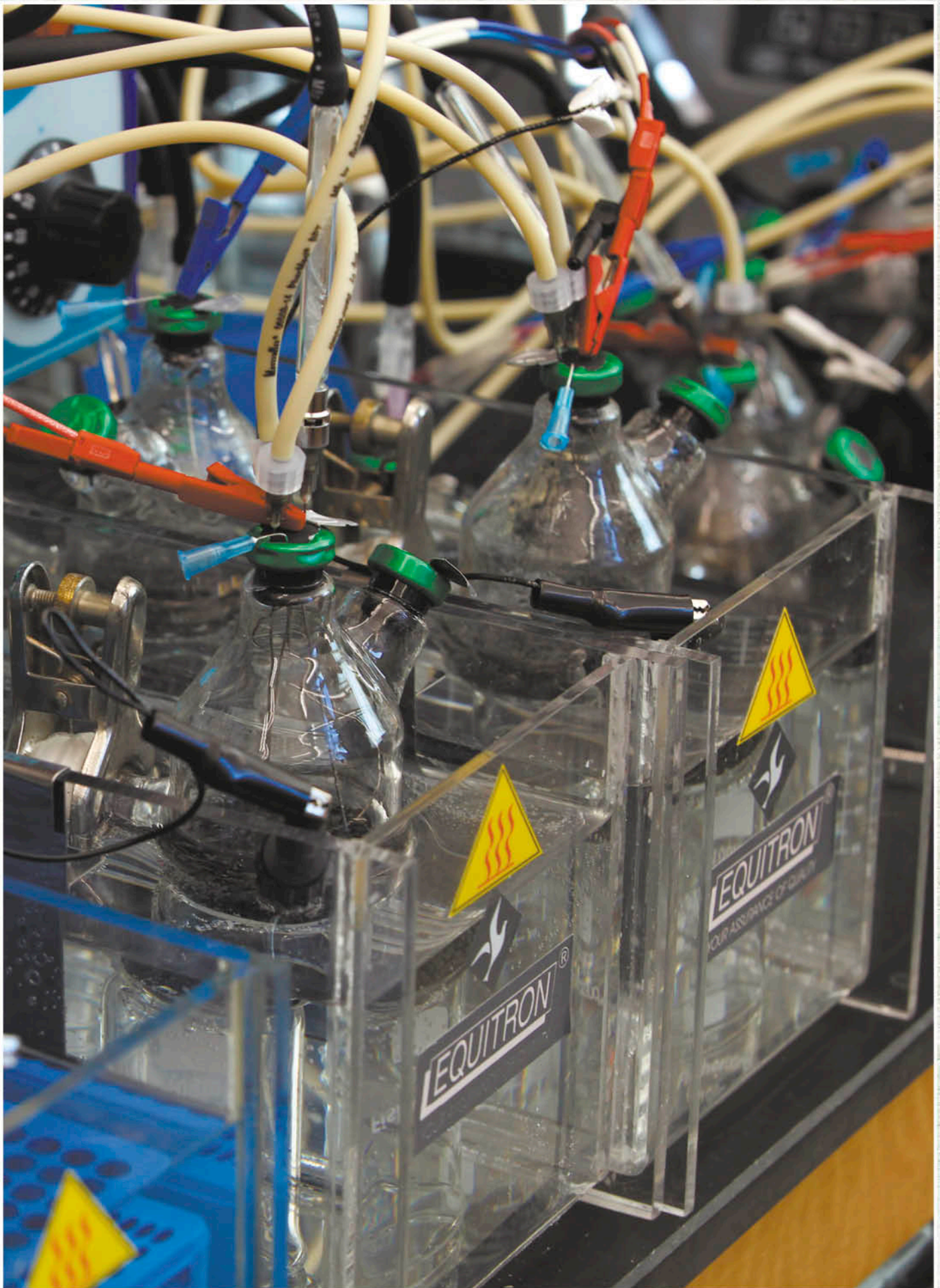
May is also interested in the ocean for other reasons. “The diversity of organisms in the ocean is so vast, we may find another microbe out there that will do this very well or make a different chemical. I want to go look.”



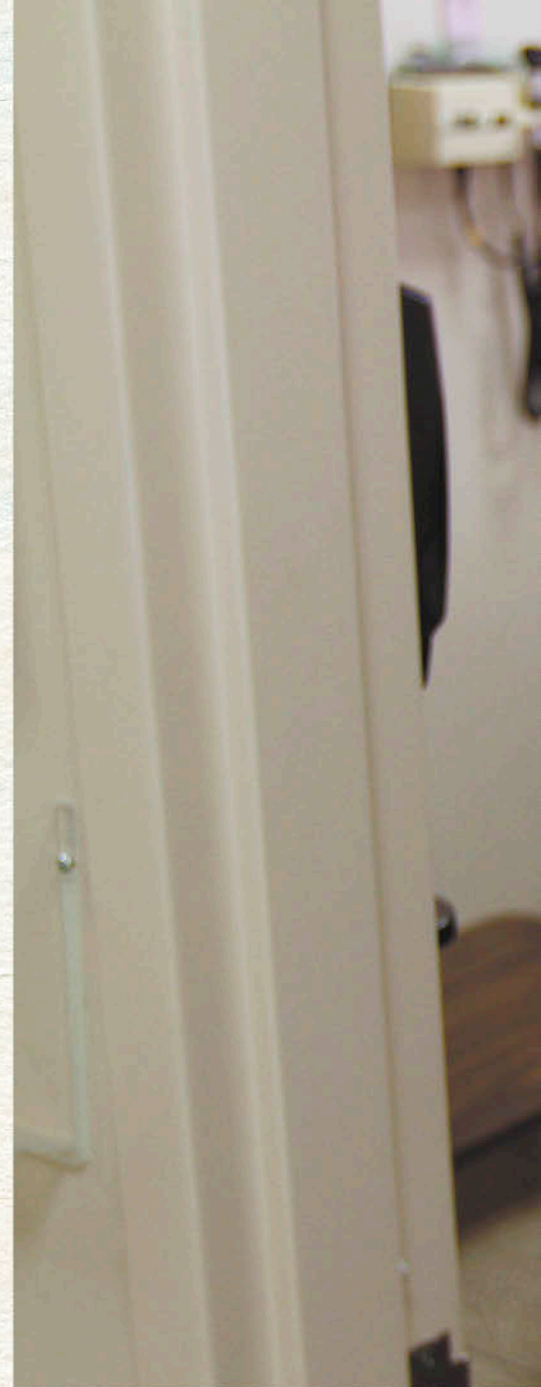
“So I proposed (that) you could put an electrode in (with microbes) and that could be the energy source for these things. The reason I proposed that because I knew the reverse was true. We can make electricity in an electrode with microbes, but can we get microbes to consume electricity in an electrode, just turn the process around. That was the basis of my hypothesis,”



May’s microbes, with a little electric current, can produce a variety of compounds, including hydrogen, acetic acid and methane.



The Environment and Lupus: Is There a Connection?



It is a disease with no known beginning, no definite path and no known cure. In fact, it may take years to even be properly diagnosed. It can strike virtually any organ in the body, from the skin on in.

It strikes more women than men, and more people of color than whites. Its effect on the human body can range from a mild skin rash to a fatal heart attack.

The age group most at risk – from 18 to 34 – is the group least aware of it, with 72 percent who have either never heard of it or know little about it, according to a recent survey.

The Lupus Foundation of America gave it a trademarked name – The Cruel Mystery.

It is lupus, which causes the body's immune system to turn on itself, unable to distinguish healthy tissue from foreign invaders. Slowly, however, lupus is yielding clues as to its origins, and


rheumatologist Diane Kamen, MD, MS, associate professor of medicine, is patiently putting the pieces together.

And patience will be vital to this endeavor.

“It can present so many different ways in so many different people,” she says. “It’s more common than people think. It’s just difficult to diagnose in many cases.”

Systemic Lupus Erythematosus (SLE) is the most common form of lupus, accounting for about 70 percent of all lupus cases. Other forms are cutaneous lupus, affecting only the skin; drug-induced lupus, caused by certain medications; and neonatal lupus, a rare form affecting infants whose mothers have certain autoantibodies.

The Lupus Foundation of America estimates that 1.5 million Americans have some form of the disease. Worldwide, the estimate is 5 million. Due to its perplexing nature, it is difficult to determine how many new cases there are annually, or, for that matter, how many deaths. Some of the more notable figures who

A portrait of Diane Kamen, M.D., a woman with long brown hair, smiling. She is wearing a black blazer over a grey top, a necklace with a butterfly pendant, and a pearl earring. The background is an office setting with a computer monitor and papers.

“We certainly see a lot of people with lupus who have no known family history.”

—Diane Kamen, M.D.
MUSC rheumatologist

Diane Kamen, MD, and colleagues see 1,600 new lupus patients annually.


have succumbed to lupus include former Philippine president Ferdinand Marcos, journalist Charles Kuralt and actor Ray Walston. Each of them lived a normal or close-to-normal life span, as do most lupus patients. But lupus has earned its “cruel” nickname. Underscoring its fatal breadth is the 2012 death of Sasha McHale, the daughter of NBA Hall of Famer Kevin McHale. Sasha, a college basketball player herself, was only 23.

And one’s station in life has no bearing on who contracts lupus and who doesn’t. Singer Toni Braxton has it and entertainer Lady Gaga has revealed a family history of lupus.


At MUSC, approximately 1,600 new lupus patients are diagnosed annually.

“Our goal is to keep people out of the hospital with as few complications as possible,” Kamen says. “That involves early diagnosis, trying to catch people and start treatment for lupus before the disease’s damage occurs.

“So we do a lot of outreach in the community to try to



“We have a large research team with a wide range of expertise to bring everything together, trying to figure out what it is that is making certain people prone to autoimmune disease.”



make high-risk communities like people living here aware of the signs and symptoms, things to look for to get screened,” she adds. “We do have good treatments, but we don’t have ideal treatments, and we certainly don’t have a cure, but that’s what we’re working on in the research realm.”

Kamen first developed an interest in lupus while a student at Northwestern University in Evanston, Ill. Her roommate had the disease, and Kamen’s first job following graduation was as a study coordinator in lupus research projects. After earning her medical degree from the University of Kansas School of Medicine, she became a resident and fellow at MUSC, working with her mentor Gary Gilkeson, MD, professor of medicine and microbiology/immunology, and a leading authority on lupus.

Connecting the dots in determining the origins of lupus is, at the very least, a daunting experience. Environmental factors play a major role in lupus, Kamen says, but there is a genetic component as well. “If you have a family history of autoimmune diseases, lupus is one of those autoimmune diseases, and they tend to run together in some families,” she says. “But we certainly see a lot of people with lupus who have no known family history.”


Where the genetics and the environment intersect is unknown, but slowly the picture may be becoming clear. Much of Kamen’s focus involves African-Americans living along South Carolina’s Sea Islands, where the potential for lupus is higher. A common finding among lupus patients is vitamin D deficiency, which was especially notable among the Sea Islanders. Adding to this mystery is the fact that the people of the West African nation of Sierra Leone, the ancestral home of many of the Sea Islanders, possess normal vitamin D levels and a much lower incidence of lupus, according to Kamen.

Vitamin D is just one environmental factor under study. Exposure to persistent organic pollutants (POPS) and other environmental contaminants is also being closely studied.


Marine biologists have found dysfunctional immune systems and high levels of these pollutants in the bloodstreams of dolphins frequenting Charleston Harbor. “Many of these POPs are waste byproducts of the textile industry, and they used to be dumped fairly freely into our waters,” Kamen says. “They don’t biodegrade for many, many years.”

As these contaminants make their way into the food chain, she adds, they could become hazardous to humans.

Water-borne toxins are not the only source of the study, however. Common chemicals in the home, such as fabric protectors and flame retardants used on clothing, carpets and furniture, are also being evaluated.



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“We have a large research team with a wide range of expertise to bring everything together, trying to figure out what it is that is making certain people prone to autoimmune disease,” she says, adding that some of today’s household chemicals may have the potential to adversely affect immune systems. “Believe me, when I went into medicine, I knew our work would be interdisciplinary but never imagined that would include marine biologists and spatial statisticians.”

In the process, MUSC researchers have amassed a huge database that continues to expand as they gather information on even the most minute details of their subjects’ lives – exposures to chemicals at work or at

home, proximity to any contaminated groundwater, air pollution, anything that may become a catalyst in the development of lupus. Kamen says there are “billions of data points” to consider.

Does she feel overwhelmed at times?

“I think I would if we weren’t getting some answers,” she explains. “Every time we look we find a little bit more, so rather than overwhelmed, maybe I would use the term ‘invigorated’ because it makes us just want to know more.”



Boneyard Beach, Edisto Island, SC

A Tree (and more)

Grows
on Ashley

“Native (trees) are really important, because they contribute to the overall natural ecosystem.”

—Nate Dubosh
MUSC arborist



It can be a classroom without walls, with recuperative powers not even the most acclaimed physician can possess, promoting wellness and even allowing man-made structures to be more energy efficient.

The Medical University of South Carolina campus – specifically its trees and shrubs – can do all this and more with appropriate planning and maintenance, according to Nathan Dubosh, university arborist. To that end, MUSC applied for and recently received designation as a Tree Campus USA, which would make it the fifth such university in South Carolina, joining Clemson and Furman universities and the University of South Carolina campuses in Columbia and Spartanburg.

Dubosh has painstakingly devised a tree care plan calling for more trees native to the Lowcountry to replace non-native trees as they die out or are removed due to campus development and landscaping changes. The benefits, he explains, are obvious.

“A healthy tree canopy provides a sense of security and has a calming effect on the human psyche,” he stated in his 20-page proposal for care and maintenance of MUSC’s trees. “Trees are effective in reducing air pollution by trapping both solid and gaseous substances from the air and converting some of these gases into oxygen for us to breathe. Noise pollution can be reduced with trees and other vegetation by planting buffers or islands of trees to absorb unpleasant sounds.”

Capturing and filtering storm water runoff is an important benefit, especially in areas in close proximity to wetlands and other sensitive habitats.

To the untrained eye, and in terms of dendrology – the study of trees – that would probably include almost everybody frequenting MUSC on a daily basis, the campus would appear to be in good shape. Dubosh wouldn’t necessarily disagree with that assessment, but says things could be better. Rather than plant a haphazard assortment of trees regardless of origin, he would prefer



Campus Arborist Has Long-Range Plan




Nate Dubosh often gets a bird's-eye view of the MUSC campus.

to bring in trees not only native to South Carolina, but, specifically, native to the South Carolina Lowcountry. Less than half of MUSC's trees are native to the Lowcountry, and two species – palmettos and live oaks – account for about half of the natives. “So we don't have a great diversity of natives,” he admits.


Dubosh's goal, however, is to concentrate on planting a more diverse array of trees specifically native to this region. As with humans and disease, genetic diversity in trees and forests equates to resistance and survival. In addition to palmettos and oaks, such native species might include the willow oak or southern wax myrtle, the American holly or the southern magnolia, just to name a few.


“Natives are really important, because they contribute to the overall natural ecosystem,” Dubosh says. “The animals, insects, the better diversity you have, the more predatory insects you have, to help control diseases and pests.”

It's not just the types of trees, but the way they are planted,




“There's a lot of research showing that patients who have views of nature scenes recover more quickly and require less powerful pain medicine.”





Rather than plant a haphazard assortment of trees regardless of origin, he would prefer to bring in trees not only native to South Carolina, but, specifically, native to the South Carolina Lowcountry.



Dubosh insists, noting that several campus trees will have dramatically shortened life spans because they were not planted properly. Compounding the challenge is allowing trees to flourish in an urban environment in the midst of buildings, streets and sidewalks. Dubosh proposes the use of a modular cell system designed for urban trees. The system can be pricey, but the return in benefits of a mature tree network, including erosion prevention and soil stability, could be worth the cost.

In addition to the direct benefit to MUSC's campus, this endeavor could position the university as a leader in this area and influence neighboring communities and developments to follow the same path, Dubosh believes.

Most of Dubosh's attention is focused on terra firma, and with MUSC's campus comprising more than 82 acres, there is much ground to cover. But there are other nooks and crannies tucked in among MUSC's 90-plus buildings, including one piece of real estate five stories high. There, on the fifth floor of MUSC's venerable 58-year-old main hospital, is an outdoor terrace overlooking the Horseshoe, long overlooked by virtually everybody.

"Nobody even knew it was there," Dubosh says. "Doctors who had been here for 15 years didn't know it was there." The

family of a patient on the fifth floor brought it to the attention of MUSC officials and made a donation expressly for the purpose of improving the view from patients' rooms.

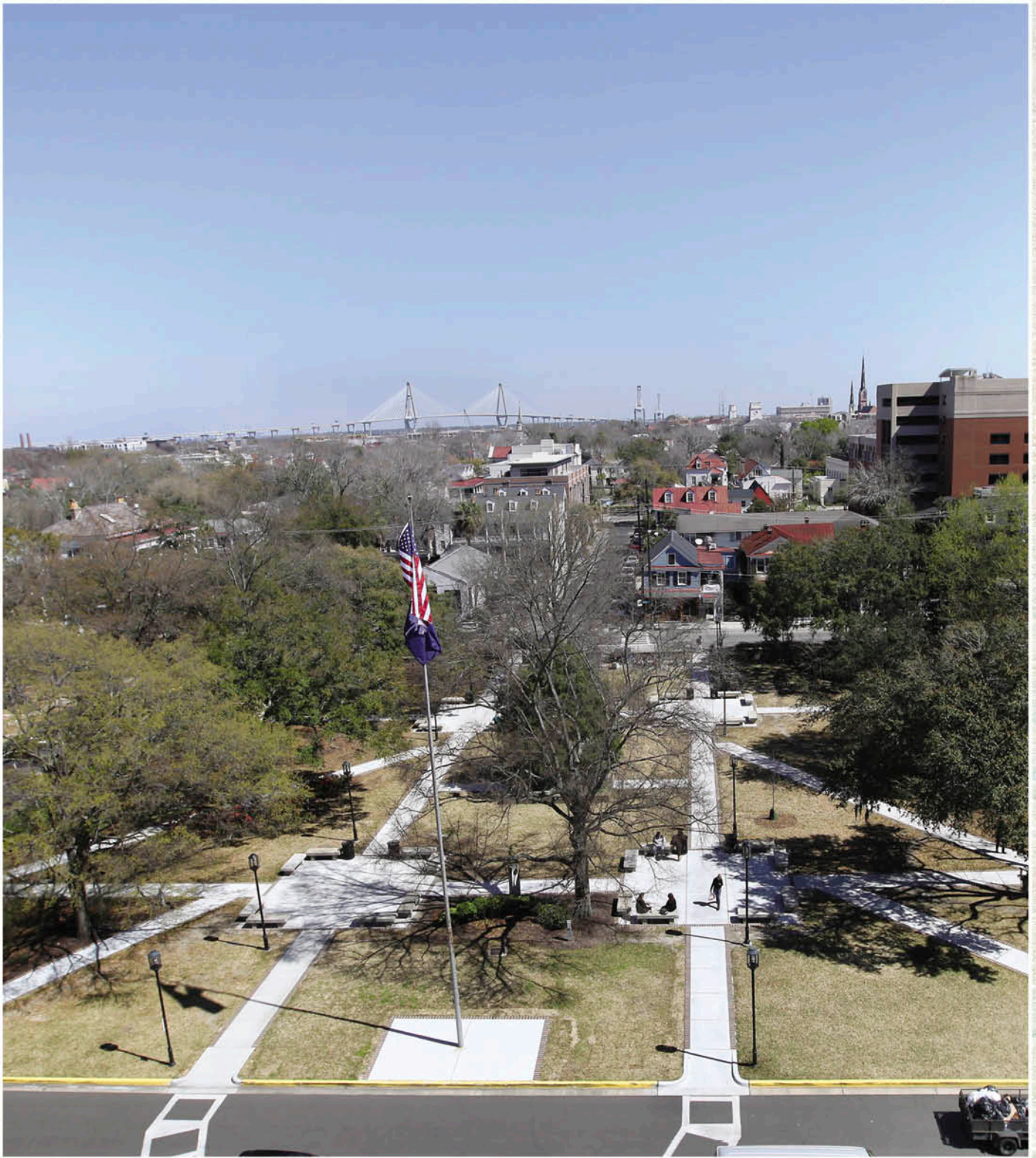
"There's a lot of research showing that patients who have views of nature scenes recover more quickly and require less powerful pain medicine," he says.

Another project involves the Ronald McDonald House, where trees would screen the asphalt parking lot from visitors'

rooms, adding to the site's aesthetics while providing the previously mentioned unseen benefits, such as reduced stress, cleaner air and soil stability.

As enthusiastic as Dubosh is about MUSC's tree care, he did not come to the university with that as his purpose. He supervised a maintenance crew, and, having some prior experience with pruning trees, volunteered to take that on when needed. When the university began looking for an arborist, he was encouraged to become certified in that field. Now, that enthusiasm is spreading.

"We have a really good crew right now – a lot of people who really care about what we're doing, are constantly learning and pushing themselves to be better," he says. If that effort continues, MUSC's outdoor "classroom" may well outlast the brick ones.



The Horseshoe at MUSC



**“There’s a generation
of kids now who
probably have no idea
what a tomato looks
like on the vine.”**

—Susan Johnson, Ph.D.
Office of Health
Promotion director

*“How ya gonna keep ’em down
on the farm
After they’ve seen Paree”¹*



At the conclusion of World War I, a somewhat comical song entered American pop culture, asking – tongue-in-cheek – how young American soldiers, many of whom grew up in rural communities, would react upon returning to their tiny hamlets from the lure of the big cities of Europe, especially Paris, and America’s Big Apple, New York City, as the Jazz Age was about to dawn.

A portion of the song’s chorus goes like this:

How ya gonna keep ’em away from Broadway

Jazzin’ around and paintin’ the town

How ya gonna keep ’em away from harm, that’s a mystery

They’ll never want to see a rake or plow

And who the deuce can parleyvous a cow?

Although the war may have exacerbated the situation, many Americans, beginning in the late 1800s, were already migrating from rural communities to the cities, looking for better jobs and opportunities away from the farms. And the migration hasn’t stopped. According to the 2010 U.S. Census, almost 81 percent



A Little Patch of Farm Life in the City




Susan Johnson, Ph.D. in the midst of the Urban Farm's greenery.

of Americans live in urban zones, nearly a 2 percent increase from 2000. Yet, there persists a desire to regain the simplicity associated with rural life away from the stress and faster pace that often accompanies city living. You can find Facebook pages and websites devoted to that issue.


On the campus of the Medical University of South Carolina, there is a half-acre devoted to this agrarian concept that has drawn crowds by the dozens. They come from all walks of life, are male and female, young and old, outdoor types and office workers itching to get their digits off a keyboard and get dirt under their fingernails. Since its opening in March 2012, MUSC's Urban Farm has attracted many volunteer "farmhands" who plant, maintain and cultivate the farm's 40 varieties of fruits, vegetables and herbs.

Susan Johnson, Ph.D., director of the Office of Health Promotion, which includes the farm, marvels at the result.

"It's been much better than I imagined," she admits.



"We thought the farm needed to be - in keeping with our mission - a place where people could come together and learn and grow."



"We kind of joke that we have magic soil, because you look around, and every time somebody comes in here, they say, 'My gosh, it's gorgeous, so green, and so lush.' We put seeds in the ground, and they just thrive here. Whatever it is, it's working."

On a brilliant, sunny fall day, Johnson sits with a visitor on one of the farm's benches. An ear-piercing ambulance siren wails away nearby, drowning out virtually every other sound around. "You get the sounds of the city here, don't you," the visitor jokes. "Yes," Johnson laughs. "It is an urban farm."

Ironically, in an age when fertile soil and woodlands are all too often paved over for streets, houses and office buildings, the Urban Farm sits on what used to be a parking lot. Tucked away on MUSC's campus near the corner of Bee and President streets, it is dwarfed by new additions to the campus' physical footprint: the James B. Edwards College of Dental Medicine and the James Clyburn Research Center.

The plot of land upon which the farm sits served as the staging area for construction of the Clyburn complex. Once it was completed, discussions ensued over what to do with the lot. Of the five or so possible options, landscape architect Bill Eubanks' proposal for a small farm won out.

A university committee devised a plan to make the farm a living classroom, open to virtually everyone, to demonstrate the connection between nutritious food and good health. Those who took part in its growth could eventually walk away with its produce, paid for by their labor. "Typically, what we do is after each session, whatever needs to be harvested that day, everybody comes together and we put it all on the table and they divide it up," Johnson says.

"We don't sell any of the produce," she adds. "Our main priority is having the produce here for the educational sessions, for people to learn." None of the produce – mostly indigenous to South Carolina – is wasted. Much of it is donated to various charitable organizations in the community.

"We thought the farm needed to be – in keeping with our mission – a place where people could come together and learn and grow. We were brainstorming who we would want to target, and we said, 'Let's start out with our own people, we want to make sure we do this right,'" Johnson says. "But the thing that has been the most rewarding for me is that as each group comes in we get little stories, quotes, pictures. Everybody that walks out of here gets something out of it and a lot of times it's something different for each person. We had a gentleman in here – an MUSC employee – I'm not sure, I think he worked for the Physical Plant, and we overheard him saying, 'This is my best day at work, ever.' He had just discovered the farm – he walked in and joined a session."

Educational sessions are held continuously through the week for school groups and for the community. For school groups, especially, Johnson hopes children who can be inundated by technology pause to notice and appreciate the world around them.

"I grew up on a big, huge farm – 25 acres – and I never really thought about it," Johnson says "but there's a generation of kids now who probably have no idea what a tomato looks like on the vine. You know what I mean? Or even in its true form, for that matter."

For that reason and more, public educational sessions are staged on a continuing basis. Some even have cooking demonstrations. Recipes and nutritional information are available for virtually all the farm's produce.

"We want to make sure whatever they're harvesting, we want them to be able to use that information in real life," she says. "If they're not going to plant a garden, at least they'll know why it's important to eat kale, or what the nutritional value is, or how to cook it. A lot of people come in here and say, 'I have no idea what to do with that,' including me."


Johnson credits the farm's success to a talented and enthusiastic team of employees from various MUSC departments, including farm manager Robin Smith, coordinator Suzan Whelan and educators Mary Helpern and Jane Madden, whom you can find most any day on the premises. From the planning and cultivating to the public events and marketing. "Each member of our team has really stepped up and done a remarkable job," she says. "We all love to work with each other."

The Urban farm is riding a wave of success for now and most likely will for some time to come. Its central location is considered prime real estate, however, and eventually could be the site of a future addition to the university's 80 buildings. While its physical presence may not be permanent, its concept is, Johnson believes. "I'm not really concerned about it right now, but it's


not going to go away," she says.

In fact, it could evolve into several smaller "farms" scattered across campus, with different groups taking ownership of the various plots. Such a scenario may be more conducive to involving more people in outdoor activities. "One thing I've noticed is that people have a really hard time getting away from work when they're here. For the majority of people that really need this type of stuff, they're tied to a desk, and they're lucky if they get 30 minutes.

And then you've got the nurses. "They work 12-hour shifts, sometimes longer, and they get very few breaks. If it's not right there, they're not going to do it. This (present location) is a great spot, but it's not necessarily convenient to everyone," she explains.



"We don't sell any of the produce," she adds. "Our main priority is having the produce here for the educational sessions, for people to learn." None of the produce – mostly indigenous to South Carolina – is wasted. Much of it is donated to various charitable organizations in the community.



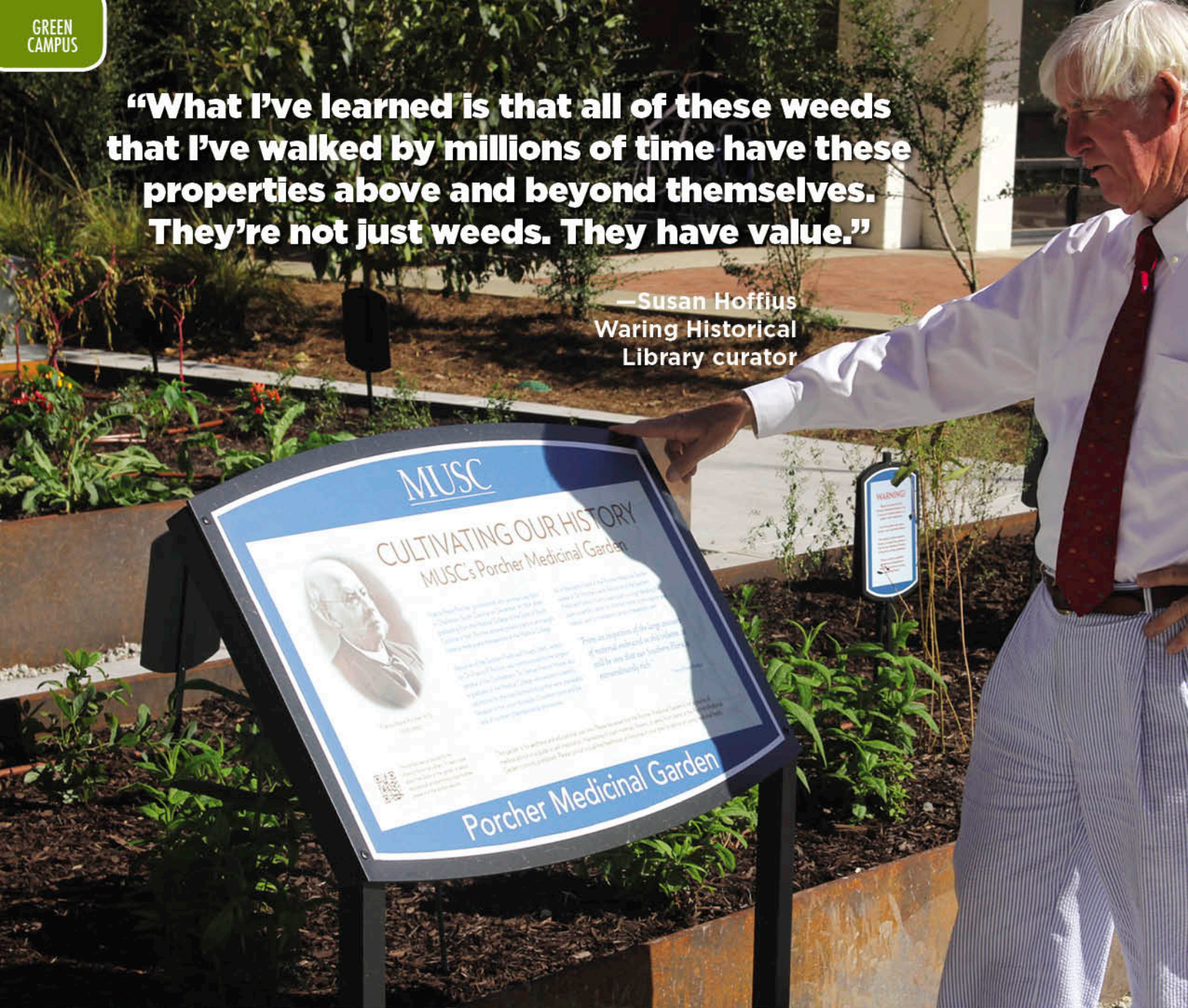


In Johnson's view, the Urban Farm makes up only a part of what she would envision for Medical University faculty, staff and students and the community at large, such as exercise stations around campus and MUSC discount passes for Charleston County's parks, for example. An outdoor enthusiast, she continues to look for ways to get people away from their desks, computers and living

rooms for some fresh air. "I love the concept of livability, and we want to create this environment where its conducive to a healthy lifestyle and people want to walk and want to be outdoors," she says. "It's livability, walkability, bike-ability – getting people outside is always good for them."

“What I’ve learned is that all of these weeds that I’ve walked by millions of time have these properties above and beyond themselves. They’re not just weeds. They have value.”

— Susan Hoffius
Waring Historical
Library curator



Green must run in the blood of the Porcher family. It's only fitting that the hands of Richard Porcher, Ph.D., helped landscape the eight flowering beds of MUSC's Porcher Medicinal Garden that opened in 2012. Porcher realized his tie to Francis Peyre Porcher, M.D., for whom the garden is named, when he was in graduate school pursuing an interest in zoology. He took a field botany course and fell in love with the subject. He also learned about his ancestor, born in 1824, and the contributions he made, including authoring the book, “Resources of the Southern Fields and Forests.”

“All of a sudden, I realized I had a botanist background,” he says, adding that he has loved being involved in picking plants for the garden. Porcher, a noted field biologist himself and former

professor of biology at The Citadel, is a member of the Waring Library Society's board of directors.

“I think the garden is fantastic. Finally, people will have an idea of the contributions he [Francis Porcher] has made,” he says. He appreciates that the garden will be a living tribute to his ancestor and credits MUSC President Ray Greenberg, M.D., Ph.D., and Susan Hoffius, curator of the Waring Historical Library, for making it a reality.

“It's a fascinating piece of history. With the garden, it all comes full circle in seeing how those plants are being used today.”

Hoffius says she likes that connection as well. “It's exciting to reintroduce someone from our past to people today. The talent he had was indisputable. He was a botanist and he came from a long line of botanists. It sort of ran in his blood. He took that interest and knowledge of local flora and made it applicable in a medical setting.”

Though Porcher's book was written during Civil War time



Medicinal Garden Cultivates History




Richard Porcher, Ph.D. studies the flowers in the garden named after his great-uncle, Francis Porcher.


to help Southerners who were suffering from the lack of medical supplies available, Porcher had a longer view of its use beyond the immediate needs of the Confederates. Not all the book is directed at medicinal uses either, she says. It's like an almanac of sorts with directions for everything from making lye soap and dyes from plants to producing brandy.

The germ of the idea for the medicinal garden came from the landscape architect, Bill Eubanks (of Urban Edge Studio in Mount Pleasant), of the Drug Discovery Building who recommended it as a nice addition. Greenberg loved the idea and wanted to tie it into MUSC's history.

"He wanted to make the connection to Dr. Porcher and looking at our future with the Drug Discovery Building and looking for new drugs and new therapies. This garden is a tribute to what we have always done, which is to innovate medicine. We were doing that in 1863 when this book came out with Dr. Porcher, and we're still doing it today. One hundred fifty years



"It's a fascinating piece of history. With the garden, it all comes full circle in seeing how those plants are being used today."





Francis Porcher

ago we had faculty members who were making really significant contributions to pharmacology and medical therapies, and we still do. I think that's a nice connection."

The garden, facing the Drug Discovery Building between the Colbert Education Center and Library and the Basic Science Building, features more than 40 specimens that are shown in Porcher's book including signage with botanical information as well as details about what the plants were used for. There also is a companion website with more information about the plants. It will list the entry it had in his book, and for those who want to know modern-day uses, there will be a link to its entry in the Natural Medicine Compendium database, a pharmacy resource that Wayne Weart, PharmD, arranged for MUSC's use.

There's a leadership team that will oversee the garden composed of people from a variety of fields, including pharmacology, history and horticulture with programming opportunities being handled by the Office of Health Promotion. There will be garden tours, lunch-and-learn events and educational sessions for students. "It will be a nicely balanced group of people looking at the garden from various perspectives, not just as a garden or a healing garden. It's the pharmaceutical and the horticultural part, the history. It's all of it together," Hoffius says. Her hope is that the garden will be an inspiration.

"It's to say, 'look at the things around us that are untapped as of now.' We should not discard something out of hand just because we're unfamiliar with them."


She refers to a botanical illustration of horsemint, part of "The Flowering of Medicine," a special exhibition of illustrations by Thomas L. Hamm and Linda Ann Vinson designed in conjunction with the garden dedication.

"I went to the beach and saw a field of this horsemint. I would have thought someone needs to get out the mower, but now I see it in a different light. What I've learned is that all of these weeds that I've walked by millions of time have these properties above and beyond themselves. They're not just weeds. They have value."


It's a value students and researchers can see in using the garden as an educational resource, including the historical materials in the Waring Library and the online website resources. Not everyone who comes to the garden will care about the medicinal part, though, and that's just fine, she says.

"My favorite thing about it would be if it's used by a variety of people for a variety of reasons, sort of like art. You can get as much as you want from it. It has a living presence and an inspirational presence, whether that inspiration is peacefulness and natural harmony or whether it's research or healing."

For more information, visit the website at <http://waring.library.musc.edu/exhibits/PMG/about.php> or contact the Office of Health Promotion, (843) 792-1245.



"It will be a nicely balanced group of people looking at the garden from various perspectives, not just as a garden or a healing garden. It's the pharmaceutical and the horticultural part, the history. It's all of it together," Hoffius says. Her hope is that the garden will be an inspiration.



Did You Know?

Francis Peyre Porcher was born at Ophir Plantation in St. John's, Berkeley County, South Carolina on Dec. 14, 1824 to Dr. William and Isabella Sarah Peyre Porcher.

Through his mother's side, he was a descendant of the well-known English botanist Thomas Walter, author of *Flora Caroliniana*, the first catalog of the flowering plants of South Carolina published in 1788.

Porcher graduated from the Medical College of the State of South Carolina. He was first in his class of 76, in 1847. His thesis, *A Medico-Botanical Catalogue of the Plants and Ferns of St. John's, Berkeley, South Carolina*, was published later that same year by the faculty of the Medical College.

During his long affiliation with the Medical College, Porcher served as professor of clinical medicine and chair of materia medica, which he held from 1874 to 1891. With fellow Medical College alumnus Julian J. Chisolm (1830-1903), Porcher opened a hospital specifically for the care of plantation slaves.

At the outbreak of the Civil War, Porcher joined the Confederate Army as a surgeon to South Carolina's Holcombe Legion and was then transferred to the Naval Hospital at Norfolk, Va. in March 1862. He finished his Confederate service in the South Carolina Hospital at Petersburg, Va.

While in Virginia, Porcher was "released temporarily from service in the field and hospital" by Confederate States Surgeon General Samuel Preston Moore to write, "Resources of the Southern Fields and Forests." The handbook identified local plants with therapeutic qualities that could be used not only by Confederate surgeons, but planters and farmers, in place of manufactured drugs made unavailable because of the Union blockade of Southern ports and the lack of southern pharmaceutical laboratories. The handbook written in 1863 was of such value that a revised edition was published in 1869.

Four editions of the manual were produced during the course of the war and are now available for research use at the Waring Historical Library.

When the war ended, Porcher returned to Charleston and resumed his academic positions at the Medical College. As his professional career thrived and he received many honors, he remained a prolific contributor to the medical literature and wrote on a variety of topics including yellow fever, diseases of the heart, typhoid and malaria.

After suffering a paralytic stroke, Porcher died at his home in Charleston, on Nov. 19, 1895.

Porcher's papers are housed at the Waring Historical Library, which has digitized them for research use.

Saving the Planet, a Little at a Time



C

hristine von Kolnitz Cooley talks trash. Real trash. Like used office paper, scrap metal, cardboard, even grease.

As sustainability manager for the Medical University of South Carolina, Cooley and her staff of 10 are responsible for the recycling of a lot of MUSC's waste, and with 82 buildings, approximately 700 hospital beds, more than 800 labs, and at least 15,000 people on the grounds each weekday, that's a lot of trash.

Consider that last year, MUSC shredded and recycled approximately 520 tons of waste office paper (all shredded for confidentiality), 309 tons of cardboard and 120 tons of yard waste, among many other items, from books to batteries. The Sustainability and Recycling Program, under Cooley's direction, handled much of that waste.

S&R has been working with Sodexo Food Services to decrease the environmental footprint of food from our cafeterias. Sodexo no longer uses plastic foam food trays in favor of paper food trays and now serves salad in containers made from corn. They also recycled five tons of grease – it turns out recycled grease can be used in bio-diesel and related products. In late 2012, the University Hospital cafeteria began composting food waste, diverting 12,000 pounds the first month from the dumpster.

Two areas in which the university has made significant recycling progress are hazardous waste and medical waste. The entire campus now recycles all types of batteries and medical facilities such as OR's and procedure rooms recycle plastic packaging now.

In all, the university processed 1,155 tons of waste in fiscal year 2011-12, roughly the weight of six adult blue whales. That accounts for 23 percent of MUSC's total waste production of nearly 3,800 tons.

“You always explain it from a dollars-and-cents angle. That’s what people know.”

—Christine von Kolnitz Cooley
MUSC sustainability manager




Christine von Kolnitz Cooley, near one of MUSC’s many recycling containers


Although the S&R program has a major influence on MUSC’s overall recycling activities, that is only part of its mission, as its name suggests. Sustainability, striking a balance between environmental, social and economic issues, is an integral part of the program’s mission. To that end, educating the MUSC population and beyond on the virtues of integrated decision making comprises a large portion of the staff’s work.

Cooley and members of her staff give on average two talks a month to various departments on the importance of recycling and sustainability, and *The Catalyst*, MUSC’s weekly newspaper, often runs informational articles to raise public awareness. The program has a presence at virtually every large public event in the area, from student orientation to commencement. In an institution this large, however, just getting the word out can be an arduous task.

Lately, however, Cooley has detected a welcome change in the institution. “In the last two years,” she says, “more people



In all, the university processed 1,155 tons of waste in fiscal year 2011-12, roughly the weight of six adult blue whales. That accounts for 23 percent of MUSC’s total waste production of nearly 3,800 tons.



have come to us, asking what we can do for them.” And she has the answers.

Cooley would like to see MUSC’s colleges include sustainability information in their curricula. “Does a new dentist know how to set up shop, using the most efficient lighting, making the office more energy efficient?” she asks, hypothetically. “Do they know that studies have shown that daylighting makes people perform better? It all affects the bottom line. You always start to explain it from a dollars-and-cents angle. That’s what people know. But we must teach our students to integrate environmental, social and economic solutions to ensure a better future for everyone.”

Cooley and her staff encourage others to save energy – primarily fuel and electricity – every chance they get. Cooley estimates MUSC receives 10,000 commuters a day, and promotes alternative methods of transportation, from bicycles to mass transit to videoconferences. Then, of course, there are the usual reminders: turn off lights when leaving a room, or computers and appliances at the end of the day. System upgrades have resulted in significant financial savings. From 2000 to 2008, Engineering and Facilities performed upgrades that save the


university \$3.1 million annually. Under an energy performance contract started in 2009, Engineering and Facilities has saved and additional \$2.5 million annually, mostly through efficient lighting, water conservation, energy management, fume hood upgrades in laboratories and campus-wide steam system improvements.

The S&R Program’s work has not gone unnoticed, earning several awards, including the 2011 Earth Day Award from the SC Department of Health and Environmental Control, 2011 Community Pride Environmental Stewardship Award and the 2010 Energy Project of the Year Award from the Association of SC Energy Managers.


The staff refuses to rest on its laurels, however, continuing to look for more work despite its relatively small size. The program continues to add patient units, operating rooms and labs to its recycling obligations. And as the university expands to other parts of the greater Charleston area, so too does S&R.

“A lot of departments are moving off campus,” Cooley says, “so we go with them.”

Trash doesn’t stand a chance.



Consider that last year, MUSC shredded and recycled approximately 520 tons of waste office paper (all shredded for confidentiality), 309 tons of cardboard and 120 tons of yard waste, among many other items, from books to batteries. The Sustainability and Recycling Program, under Cooley’s direction, handled much of that waste.



Q&A with Robin Smith



—Robin Smith
MUSC Grounds
Department supervisor

Q Position and length of time with MUSC?

A Grounds Department supervisor; 3 years

Q Describe your duties.

A Supervise all aspects of landscaping on campus

Q What is a typical day of work like?

A I usually do my morning walk to make sure everything looks good on campus. After that, emails, meetings, digging in the dirt and making sure my employees are happy!

Q What's the best part of your job?

A Creative freedom!

Q What's the hardest part of your job?

A Not having all of the crew in the same location. We are all spread over 80 acres.

Q How does your work help with recycling/sustainability?

A The Urban Farm recycles coffee grounds from Starbucks to use in our veggie beds! And we also have started to use less chemicals on campus and

more biodegradable oils to run our lawn equipment.

Q How has the recycling/sustainability movement changed since you've been here?

A I love the idea of recycling our food waste!

Q What, if any, improvements could MUSC do for recycling/sustainability?

A Christine Cooley is working on putting a recycle bin by every trash can so we can reduce trash and increase recycling!

Q Is there a project or campus site of which you are most proud?

A The Clinical Science Building perennial garden is my favorite project so far because it is full of color year around!

Q What advice would you have to help people with recycling/sustainability?

A I read once that it takes 450 years for a plastic bottle to decompose. That bottle would be in the landfill for my children's-children's-children's-children. How sad!! After that I decided that I would try my hardest to throw my bottles in the recycle bin! That kick started my recycle habit!!



“The Clinical Science Building perennial garden is my favorite project so far because it is full of color year around!”



GIVING

MUSC
Philanthropy

Something Special Happened This Past Year.

In the midst of a sluggish economic recovery, nearly 12,000 people, businesses and foundations gave almost \$77 million in private gifts and pledges to advance the work taking place at the Medical University. Those gifts made it possible to build new facilities, fund scholarships and programs and recruit and retain the best faculty and students, according to Jim Fisher, MUSC's Vice President for Development and Alumni Affairs.

"We share a vision and, together, we are able to achieve more than the state alone can afford," Fisher said. "We are very fortunate to have benefactors who support us through their giving, especially during Wall Street's economic challenges. Such a show of support is indicative of the confidence the university's friends have in the mission, leadership and employees of MUSC."

Among the year's high points in philanthropy:

The number of benefactors making a gift to the university increased 6 percent.

Alumni giving grew by more than a third, to \$6.5 million.

Gifts from foundations jumped 66 percent, to 18.8 million.

The largest portion of the year's gifts (\$23 million) came from individuals who did not graduate from the university.

The largest increases in giving occurred in MUSC Children's Hospital (88%), the College of Health Professions (183%) and the Heart & Vascular Center (459%).

And, in one of the more interesting jumps of the year, MUSC employees gave 214 percent more than the previous year.

People who work on this campus didn't just say that they believe in the research, patient care and education provided at MUSC; they emphatically declared it by designating some of their own pay to support programs here.

Giving by faculty and staff nearly tripled in 2011 to more than \$1.1 million in 2012. A large portion of those contributions was raised through the university's Yearly Employee Support (or YES) Campaign, which provides grants to projects that further MUSC's mission.

Since the YES Campaign launched in 1985, employees have contributed more than \$6 million. The average participant gives \$578 per year, or \$1.58 per day. Those donations sustain more than 1,300 programs that range from scholarships to support groups to medical care for patients who otherwise couldn't afford it.

"A gift to the Medical University radiates hope to all our patients, students and faculty," Fisher said. "That gift also radiates out and instills confidence in the minds of potential donors. When an MUSC employee invests in our workplace, it speaks volumes to our friends off campus."

Highlights from Last Year's Accomplishments

A Look Back at the Fiscal Year

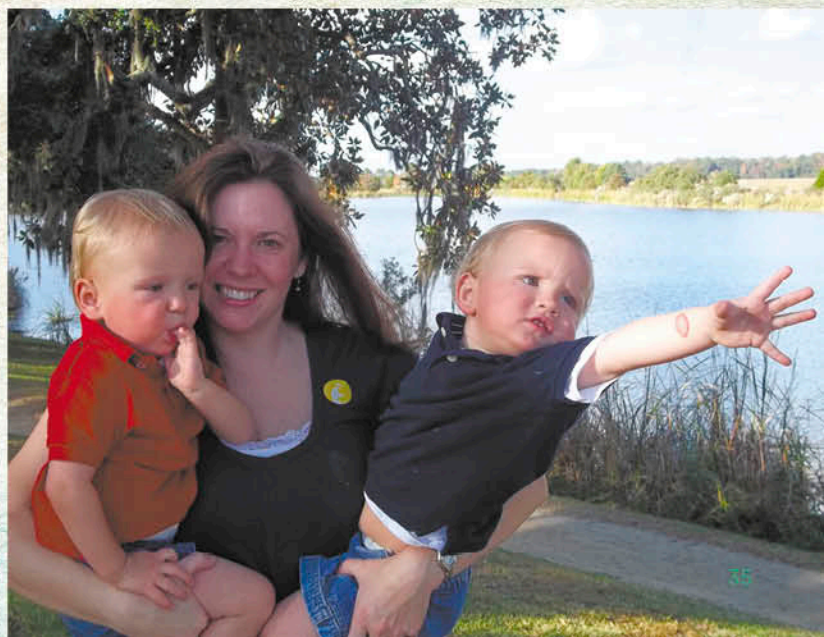
Krista Mysock knew during her pregnancy that one of her twin boys faced a complicated first few weeks of life, and she knew she wanted him to spend those days at MUSC.

Parker was diagnosed with an omphalocele, an abdominal wall defect in which his intestines developed outside his body within a thin layer of tissue. While his brother, Griffin, went home after a couple weeks of monitoring, Parker spent more than a month in the Neonatal Intensive Care Unit and underwent two surgeries to repair his tiny belly.

"We knew when we were having twins that we wanted to be here," said Krista, who worked in MUSC Student Services at the time. "We were so fortunate to know about the omphalocele ahead of time, it allowed us to prepare and know what to expect mentally and emotionally. Not everyone is so lucky."

Krista and her husband, Justin, found comfort in the Neonatal Intensive Care Unit, a place where patients' parents spend some of the most draining days of their lives. "We got to know the nurses, physicians and respiratory therapists," Krista said. "They helped make a difficult time less scary because of their commitment to patient care and family."

Griffin and Parker are now healthy 1 ½-year-old boys. Once they both came home, Krista felt drawn to work in pediatrics. She now serves as a residency coordinator in the Department of Pediatrics and, each year, she gives back to the Neonatal Intensive Care Unit through the YES Campaign





Security Coordinator **Marshall McFadden** trains new officers, not just in policies, but in people and what to expect in a uniquely emotional medical environment.

“Most of the people here in the hospital are either sick or they’re here to visit someone who is sick,” he said. “When they come in, one of the first people they see is a security officer. A lot of times, it’s the last person they’re going to see on the way out. We try to make a good first impression and a good lasting impression.”

Marshall joined the MUSC security team when he retired from the U.S. Navy in 1993. Almost from the start of his 20-year career on campus, he donated to the YES Campaign. He initially felt compelled to contribute to the minority scholarship but now designates a variety of funds.

“I look at MUSC as being a very fine organization to work for,” he said. “By contributing to the YES Campaign, I’m giving to an organization that employs me, so I’m also giving back to myself.”

By contributing to the YES Campaign, I’m giving to an organization that employs me, so I’m also giving back to myself.”

Cathy Martin first heard about YES Campaign from some excited heart doctors.

Cathy worked in Cardiology in the late 1980s, when open-heart surgery and same-day catheterizations were new procedures. “There was a lot of research in cardiology back then – and there still is,” Cathy said. “All of the doctors were excited about having the campaign to help with that.”

She made her first contribution to the YES Campaign 23 years ago and remains one of the most longstanding donors. “I know that they are doing research that will help people in a wonderful way,” she said.

Cathy now coordinates faculty affairs at the College of Medicine and supports funds that help students meet the demanding cost of medical school. She also plans to make future donations to cancer research funds in honor of family members fighting the disease.

“There was a lot of research in cardiology back then – and there still is. All of the doctors are excited about having the campaign to help with that.”





Gifts to the Yes Campaign provide funding to support more than 1,300 programs on campus, including a support group for teenage girls with sickle cell anemia.

Amauri Bowman received an unexpected gift while resting in the hospital during a painful episode with sickle cell anemia a few years ago.

The jewelry kit came with a note inviting her to join a group called Sickle Cell Sisters when she turned 13. This unique sorority, the note explained, brings together local teenage girls who struggle with the same disease.

“I thought it would be cool to meet other people who had sickle cell and who know what I’m going through,” Amauri said. Now in her second year as a “sister,” the 14-year-old Porter-Gaud student said, “It ended up being exactly what I expected.”

Every other month during the school year the sisters, who all suffer from the blood disease, get together for an outing. They make jewelry. They bowl. They throw a paint splatter party.

The program is therapeutic by design but never forced. Child Life Specialist Melissa Hale said she and the other organizers don’t lead the conversations. They simply provide the setting.

“At first, they are just getting to know each other,” Hale

said. “By the second meeting, they start talking. Then they open up more and ask, ‘Do you have ports?’ ‘When do you go for transfusion?’ They talk about things they can’t talk about with other friends who don’t have sickle cell anemia.”

Sickle Cell Sisters operates on \$2,500 of annual funding from the YES Family Fund. “Without the grant, there would be no group,” Hale said. “The YES Family Fund supplies us with the means to provide these girls with an opportunity that they might not otherwise have – the opportunity to spend time with other girls who share the same medical treatments and experiences.”

Amauri’s favorite activity was visiting Charleston Cooks! last year. She and the other girls learned how to prepare ham and cheese crepes, fruit parfait, grilled chicken salad and baked and fried doughnuts. Amauri said she also enjoys the open dialogue that accompanies the gatherings.

“Sometimes you just need to talk about it, like if they just changed my medicine again,” she said. “They are going through the same thing I am.”

REVENUES

UNIVERSITY

State Appropriations	\$ 100.2
Grants, Gifts, Contracts	206.5
Sales and Services	161.7
Tuition and Fees	76.8
Other	17.4

MEDICAL UNIVERSITY HOSPITAL AUTHORITY

Patient Services	1,030.3
Other	18.9

MUSC PHYSICIANS

Patient Services	302.2
Other	21.9

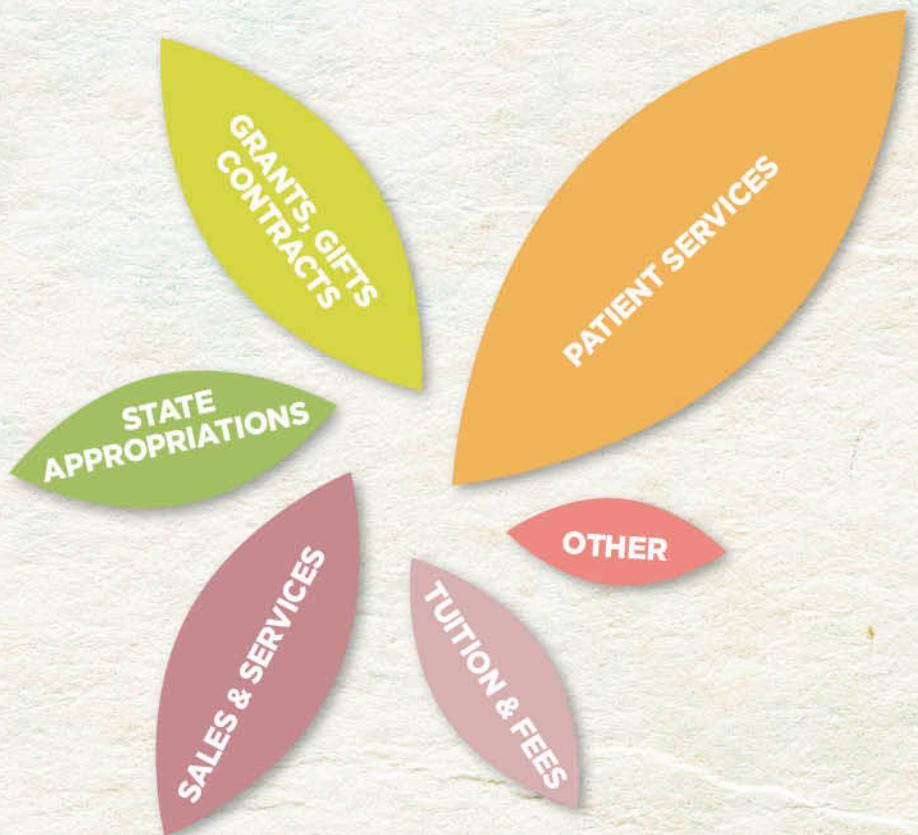
NONMAJOR ENTERPRISE FUNDS

1.6

ELIMINATIONS

Other	(1.4)
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TOTAL \$1,936.2



IN MILLIONS OF DOLLARS

EXPENSES & TRANSFERS

University 545.7

Medical University Hospital Authority 1,041.8

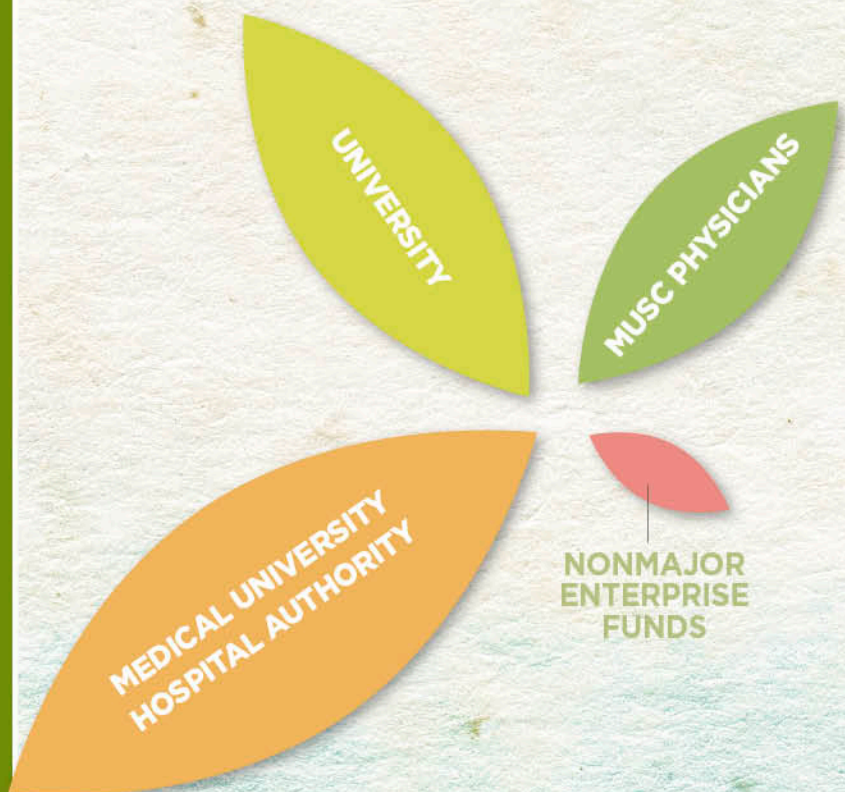
MUSC Physicians 314.4

Nonmajor Enterprise Funds 1.3

Eliminations (1.4)

TOTAL \$1,901.8

INCREASE IN NET ASSETS \$34.4

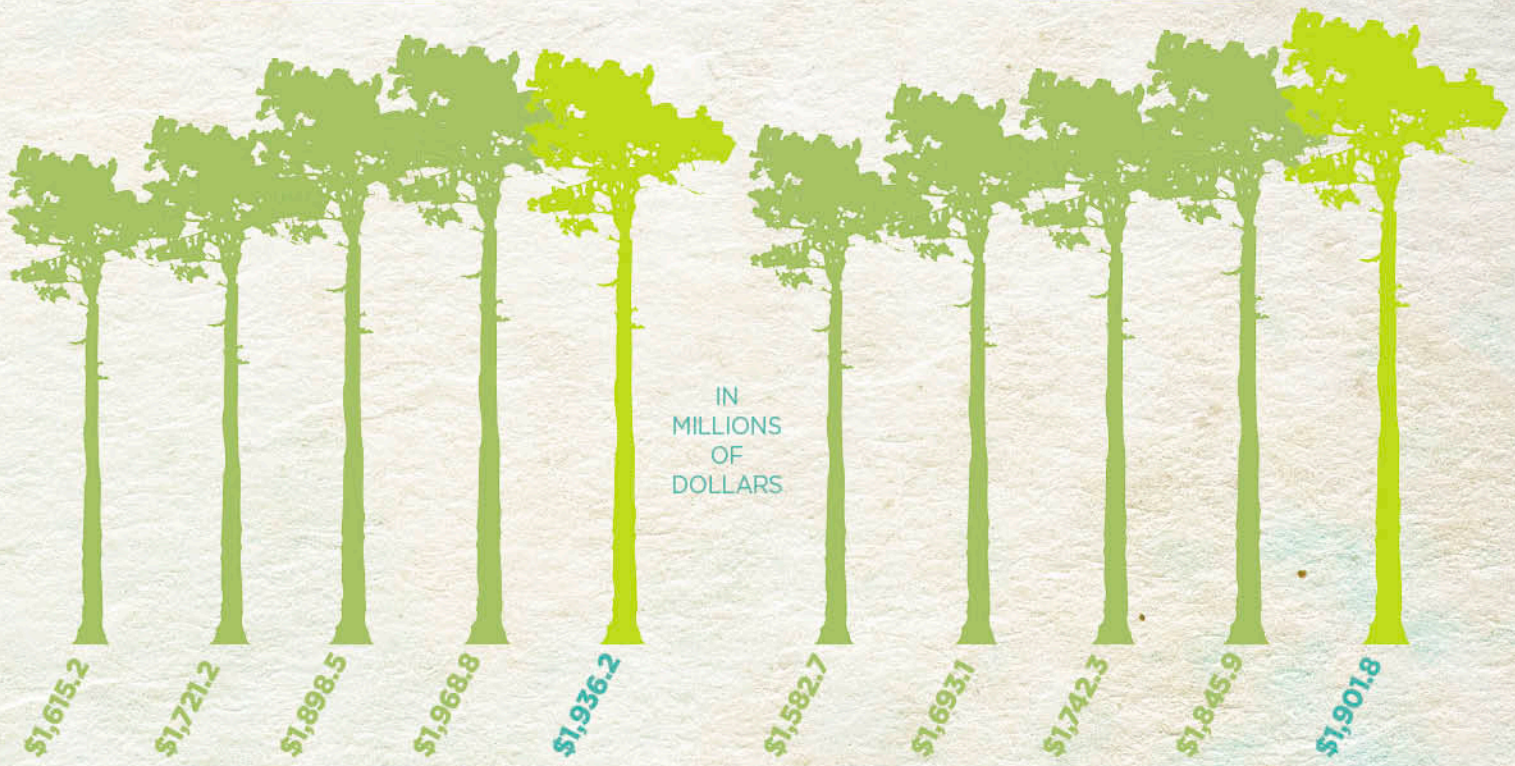


Note: The Nonmajor Enterprise Funds are comprised of the Medical University Facilities Corporation and CHS Development Company. Source: Audited Financial Statements for the year ended June 30, 2011.

MEDICAL UNIVERSITY OF SOUTH CAROLINA

REVENUES

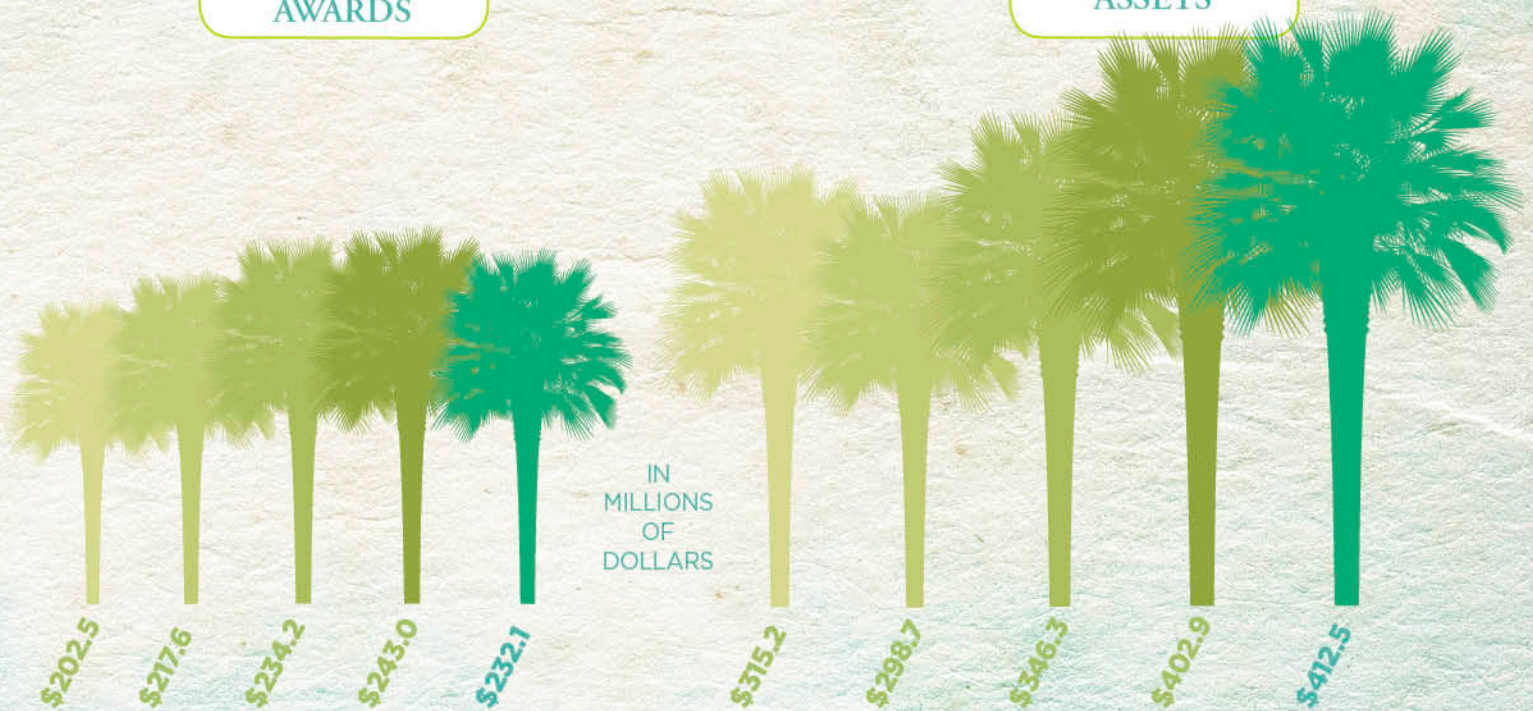
EXPENDITURES & TRANSFERS



[YEARS 2008 THROUGH 2012]

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