Commencement Address, Aug. 24, 2008, Ohio State University

David L. Denlinger

President Gee, Members of the Board of Trustees---Thank you for the opportunity to participate in today's celebration. Graduates, I congratulate you on a job well done. And, thank you parents and friends for standing by these graduates. Without such support I suspect this celebration may not be happening. Graduates, I do hope you will take a moment today to thank those people who love you dearly and who have supported you during your student days, both in the good times and through those rough spots. I'm sure you can rest assured that these same people will continue to root for you as you venture forth.

Well, no one would be more surprised to see me here today than my old high school guidance counselor who, after giving me an aptitude test, declared that I should be a cowboy! It was that confident look on his face that said "I got him pegged" that I remember to this day. Actually, he may have been right. I do like singing cowboy songs around the campfire! And, I've been chasing critters across the savannahs of East Africa, into the rain forests of Panama, and over the ice fields of Antarctica for many years. But, the critters I've been chasing have six legs, and they're much smaller than those bovines I grew up chasing around our family farm.

It isn't that I didn't know what I wanted to be when I grew up---- it's just that being an entomologist wasn't one of the options on that aptitude test! In fact, I knew very well

what I wanted to do, and that's why my first THANK YOU goes to the land grant universities! I grew up as a gung-ho kid bug collector, living on a farm in eastern Pennsylvania. My family lived there ever since William Penn's son Thomas went up and down the Rhine River Valley recruiting my ancestors to this new land known as Penn's Woods. Quite frankly, in that rather sheltered community, I knew of few career options beyond farming. That's where the land grant universities came into play! The "eureka" moment for me came long before my college days, when a Penn State Entomology professor, Dr. John Pepper, visited our Lancaster County 4-H Club to talk about insects and answer questions from those of us taking entomology projects. He supplied us with insect pins and shared tips on finding some of those really cool bugs! Before this fortuitous encounter, I had no idea that someone could make a living doing what I assumed was just fun! From that moment, I knew what I wanted to be. For simply opening my eyes to such new possibilities, I feel an enormous debt of gratitude to the land-grant universities. So, I extend my thanks to these universities, like Ohio State, for taking their mission of outreach seriously and for helping me discover a rewarding career at an early age. I suspect that this great university has provided a similar launching pad for many of you. Although you may not have identified a career goal at such an early age, it is my hope that all of you have also been able to identify your passion, whatever it may be. Follow that passion----I can think of no easier route for success!

My second THANK YOU goes to you, my students. Contrary to what you may have assumed, this is not a one-way street! I suspect I've learned as much from you as you have from me.

You've shown me a whole new level of multi-tasking---you can listen to lectures and text message at the same time. And, you don't waste your time just walking to class—you productively spend that time on your cell phone.

But, on a more serious note—

You have pushed me to take our research to new levels. While I was content to continue asking questions at the organismal level, you pushed me to dig deeper and go after those underlying genes that insects use to measure the length of the day and make preparations for winter. Thanks to that prodding, today we are looking at thousands of genes simultaneously, trying to figure out the network of genes that dictate how insects shut down their development for the winter and start up again in the spring. The successes we've enjoyed are shared successes.

You have also introduced me to the world. Names of my students, postdocs and collaborators stretch from A to Z—Adedokun from Nigeria to Zdarek from the Czech Republic. From names as short as Xu (X U) from China to names as long as Manthri Samaranayakaramaswamy from Sri Lanka. You've taught me that the sons and daughters of Ohio, China, Korea, Nigeria, Iran, Poland, and the United Kingdom can all work together effectively to solve problems. For that I thank you.

But, my next THANK YOU is reserved for the little creatures I study. I, of course, couldn't resist bringing one along today. This is indeed probably the first and the last

bug to make an appearance at an Ohio State graduation! Sorry, this walking stick is a bit small for most of you to see, but perhaps at least those of you in the front row can see her.

I stand it awe of this creature. This graceful insect can walk, run, see, smell, hear, taste, feel, learn, and do almost everything we can do. We can learn much about ourselves from a creature such as this if we take the time to listen.

The fruit fly has already taught us much about our own genes and biology. It was indeed fruit fly genetics and the sequencing of its genome that paved the way for the human genome project. Many of the genes now known in humans were first found in that lowly fly. And, with a bit of ingenuity, it is possible to develop insect models to probe a range of human maladies including obesity, alcoholism, and sleeplessness.

Insects, of course, have gotten a bad rap! Most are our friends, but a few are indeed our worst enemies. We in America have become a bit complacent because we have succeeded in ridding our country of many scourges of earlier years. Typhoid fever, a fly-borne disease that killed nearly as many combatants as did bullets during the Civil War, has been laid to rest. Epidemics of yellow fever were once frequent in our port cities of Philadelphia, Baltimore, Charleston and New Orleans. The physician Benjamin Rush suspected rotting coffee dumped on the wharf as the cause of the 1793 epidemic in Philadelphia. More than 100 years went by until that disease was finally linked to mosquitoes. Much of Northwestern Ohio was once malaria ridden, but few people living today appreciate Ohio's history of malaria. Yet, that mosquito-transmitted disease

continues to wreak havoc across Africa, Asia, and South America, killing over a million people annually, most of them children. One of my own interests in tropical medicine is the tsetse, a fly that carries human sleeping sickness and nagana, the animal form of the disease. Up to 70,000 people in sub-Saharan Africa are infected with this lethal disease, and tsetse renders a chunk of Africa, roughly the size of Europe, unsuitable for raising grade cattle.

But, these are not just diseases and insect problems in far away places. This new flat world, as Thomas Friedman calls it, brings us into regular contact with products from around the world, and these products bring way too many pests along for the ride.

Several years ago, the Asian tiger mosquito hitchhiked into Houston on a shipload of used tires from Japan. I'm not sure why we need to import used tires from Japan, but such is the global economy! Following its arrival in Texas, this mosquito has progressively spread north and arrived in Columbus just this summer. It's a vicious biter. Many of you have probably already donated a blood meal! But, the more scary part of this story is that this mosquito has the capacity to transmit dengue, a debilitating disease, also known as breakbone fever because of the severe muscle and joint pain that goes along with this disease. Fortunately, the virus that causes dengue did not come along for the ride, but since the mosquito vector is here, the stage is set for transmission of dengue if the virus were to be introduced. Hopefully this will not happen, but you can appreciate why it is absolutely essential that we continue to be on guard and monitor this situation closely.

I'm sure you are already well aware of the many other pest species that have entered this country----the emerald ash borer is only the most recent, but it joins others, such as the Asian longhorn beetle, the Japanese beetle, the gypsy moth, and other invertebrates such as zebra mussels that were dumped into the Great Lakes along with ballast from a Russian tanker about 20 years ago, and exotic plants such as garlic mustard and honeysuckle that are choking out our native plants. Lest you think we are only the recipients, let me assure you we have given as well as received. Our Colorado potato beetle has devastated the potato fields of Europe. The costs of these sorts of mistakes are enormous. How do you even put a price tag on the destruction generated by the emerald ash borer as it completely alters the composition of our eastern forests? Such disasters ripple across the ecosystem destroying the habitats of our native plants, insects, birds, and mammals. The huge increases in world trade dramatically boost the frequency of such invasions, forcing us to step up our ability to prevent and intercept such accidental introductions.

But, rather than dwelling on these few bad insects, let me assure you that most insects are indeed our friends. Our world could not function without them. Without pollination services from bees and other insects, we would be without apples, avocados, almonds, blueberries, cherries, cantaloupes, cucumbers, cranberries, and lots of other crops---industries worth over $15 billion to our country's economy. The recent colony collapse disease that has stricken honey bees reminds us how vulnerable we are and how essential it is to promote the health of our insect friends.

Insects have also taught us valuable lessons---let me cite just a couple lessons generated by work from colleagues in my own department:

Walter Rothenbuhler, for whom our honey bee laboratory is named, was the first person to demonstrate, in any animal system, a genetic basis for behavior. This classic study on honey bees, launched the exciting new field of behavioral genetics.

Another one of our giants, Professor Fred Hink, was the first to demonstrate immune responses in insects. His work elegantly laid the foundation for pharmaceutical prospecting in insects, the search for new antibiotics, antiviral and antifungal agents that may be useful for human health. At the present time we rely primarily on drugs that have been discovered in plants and thus can be harvested in abundance, but with the advent of molecular biology we can now search for such products in insects. Insects are pharmaceutical warehouses replete with all sorts of defensive chemicals that can ward off infection---rich resources that we can look forward to tapping in this new century. At the time of his retirement, Professor Hink was hot on the trail of an anti-arthritic compound present in the venom of a South American ant, a remedy well known to the indigenous people of Colombia.

My challenge to you is to THINK SMALL! As Harvard entomologist E. O. Wilson says, "it's already the little things that run the world". Give insects the respect they deserve. Enjoy them, learn from them, and continue to fill Ohio Stadium with your cry "Go

Bugs"---that is what you're saying isn't it? Sorry, I know I shouldn't mess with something so sacred!

In closing, let me say that as I look out over this audience of graduates I'm impressed with what you have already achieved. But, this is just the beginning---you have learned how to think, how to raise questions, and how to seek answers. Armed with these tools you have a bright future, and our world desperately needs what you can offer. I must say, I am not proud of some of the things that have happened during my generation's watch. In many ways it feels like we have taken some turns in the wrong direction.

But, I am hopeful in turning over the reins to you. I sense that you are already pushing toward a higher plane and a new ethos---an ethos that goes beyond nationalism and embraces world citizenship, an ethos that cherishes the earth and all its inhabitants from the tiniest of insects to the human family, an ethos that seeks social justice for all of humankind, and an ethos that beats those swords into plowshares and seeks ways for humans to live together in a shared peace and prosperity. This is a huge assignment, but I do think it's within your grasp!

Work hard at creating a wonderful future for all of the earth and the creatures that dwell therein. You go with my very best wishes for a meaningful and fulfilled life. And, finally, thank you for being such an important part of my life.