



BioLogue

WRIGHT STATE UNIVERSITY

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DEPARTMENT OF BIOLOGICAL SCIENCES

DR. DAVID GOLDSTEIN, CHAIR

NOTE FROM THE CHAIR...

The Skinny on Dieting

It's no secret that the incidence of overweight Americans has been on the rise for quite a while. A series of color-coded maps on the CDC web site (<http://www.cdc.gov/obesity/data/index.html>) illustrates this graphically: In 1985, the eight states reporting the greatest proportion of overweight adults had 10 – 14% of individuals with body mass index (BMI, defined as the ratio of body mass in kilograms to the square of height in meters) greater than 30 kg/m^2 , the lower end of what is usually classified as "obese." By 2008, six states had more than 30% of adults with $\text{BMI} > 30$. Thus, it is not surprising that talk of calories and weight loss are common. Indeed, it's hard to go long without hearing something about dieting, whether it's casual talk in the office or on the cover of Newsweek (the most recent issue features Michelle Obama's "fight against childhood obesity").

It's also no surprise, then, that plans to combat weight gain are equally common. I read that Amazon sells more than 22,500 titles on the topic of dieting. I'm sure you could readily name a list of diet plans: the Atkins diet, the South Beach diet, the Mediterranean diet, the grapefruit diet, the Neanderthal diet, the almond diet, My own prescription for weight control is usually a simplistic one: eat less, exercise more. But teaching Bio 111 recently got me thinking about the topic.

First, a few basic facts. The body stores excess energy in two forms. The first is carbohydrate; some sugar is stored as glycogen, a polymer of glucose. However, these stores are relatively small; in a healthy adult, the store of glycogen in the liver is only about 100 g (a quarter-pound). The second form of energy storage is as fat (triglycerides stored in adipose tissue). In contrast to glycogen, fat can be stored in large quantities, as you no doubt are aware. The likely reason that animals store excess energy primarily as fat is because of its higher energy density. Oxidation of fat yields approximately 9 kilocalories per gram ($\text{kcal/g} = \text{Cal/g}$), whereas burning glycogen yields just under half that. In addition, glycogen is stored

with substantial water, about 2.5 g water per gram of glycogen, whereas adipose tissue contains little water. Thus, the body can store 9 Cal of fat in just 1 g of tissue, whereas storing that much energy as sugar requires about 8 g, a much heavier load.

Fundamentally, then, dieting is simple: to lose mass, the body needs to burn more energy than it acquires. In other words, dieting is a question of balance. Because most of the body's stored energy is fat, one can easily calculate the "imbalance" necessary to lose (or gain) body mass. To lose 1 g of fat requires burning an excess of 9 Cal. One pound contains 454 g. Thus, to lose 1 pound of fat requires burning an excess of $9 \text{ Cal/g} \times 454 \text{ g} = \text{about } 4000 \text{ Cal}$.

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Shawn Heflick: Featured Alumni in PBS Video

Shawn, a Wright State University biology graduate and long-time snake enthusiast, was recently seen in the PBS Nature presentation "Invasion of the Giant Python." This special focuses on the non-native Burmese Python, which is increasingly influencing Southeastern ecosystems, including the Everglades National Park. Shawn highlighted the program that seeks to capture pythons and to collect pertinent data to better understand the effects of this population on the environment. It is thought that these pythons were released into the wild as the result of Hurricane Andrew nearly 20 years ago; some estimate the population in Florida may now number close to 100,000. The video features Jackie Navarro from Wild Wonders and Pugsley, a 13 ft. albino Burmese Python. Pugsley is an owner-relinquished python that now is a part of a conservation and education program. An interesting fact: this wild population has very little genetic variability. There was at least one facility with over 900 pythons that was completely destroyed by the hurricane. This center was near what is believed to be the epicenter of the population and it possessed animals from the same genetic origin. To learn more visit PBS.org. The entire video can be viewed for free.





New Biology Advisors join the Department

Dr. Patricia Roberts



Dr. Patti Roberts joins the Department of Biological Sciences as an advisor after having served as an academic advisor in University College here at Wright State University for nearly ten years. She brings a wealth of experience as both an advisor and professor, having worked previously at Gallaudet University, The Smithsonian Institutions, the University of Akron and Case Western Reserve University. "I am excited to be a member of such a dynamic department and look forward to working with students during their tenure here in the Department of Biological Sciences."

Courtney Smith



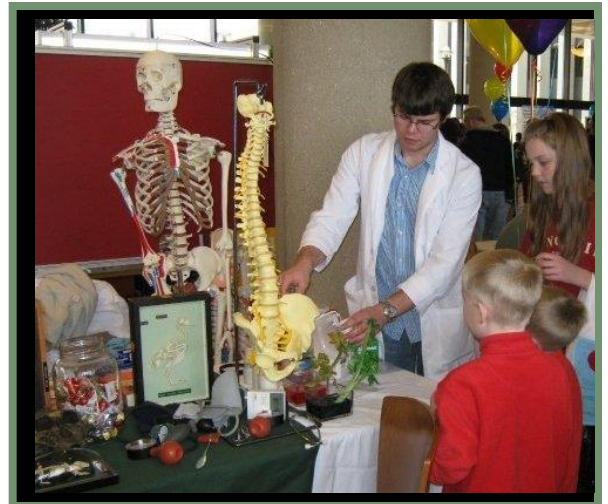
Courtney is excited to be back in the Department of Biological Sciences as an academic advisor. She graduated in 2005 with a Bachelor's of Science in Biology from Wright State University and worked in research for WSU in the Department of Neuroscience, Cell Biology and Physiology. She recently completed her master's degree in Student Affairs in Higher Education and is looking forward to advising students. "I am thrilled to be back in the sciences and to be working with Wright State students who are in a program that is very dear to my heart."

TechFest 2010

Wright State University undergraduate students who work in the Freshman Biology Labs helped to facilitate the 8th Annual Dayton/Miami Valley TechFest at Sinclair Community College.

This event featured more than 70 interactive hands-on exhibits and demonstrations and more than 30 informative presentations. This event is geared towards youth and educators in the STEM fields-it is a great Miami Valley program for education motivation!


WSU students who participated included: Travis Rotterman, Josh Fries, Brittany Reinert, Deanne Duval, Shanti Yount, and Kelly Conti.



WSU Faculty Point of Pride:

Dr. Kenyon learned that her paper "Making scientific modeling accessible and meaningful for learners" is one of the top-three most accessed papers in the Journal of Research in Science Teaching.





Note from the Chair continued... Given this requirement, how quickly can one lose weight by dieting? The claims of diet promoters on this score can be quite fantastic. The site www.18in4.com, for example, shouts out, “lose 18 pounds in 4 days!,” with no gimmicks, no exercising, no diet additives or meal replacements. Is that possible? 18 pounds in 4 d equates to 4.5 pounds per day; that fat would contain about 18,000 Cal. Could you spend that amount of energy in a day?

The daily energy expenditure of a “typical” adult is something like 2000 – 2500 Cal/d. What is the maximum that is sustainable? An interesting article (“The limits of endurance exercise,” *Basic Res Cardiol* 101:408–417, 2006) reviewed the energy expended by humans engaged in a variety of endurance events, including the Tour de France bicycle race, the 6-day pedestrian running race, and others. According to this article, the single greatest feat of human endurance exercise was Robert Scott’s 1912 Polar expedition, when Scott and his party man-hauled sleds across the Antarctic for 159 d, each person expending 1,000,000 Cal over that time; note, though, that on a per day basis, that’s still just 7000 Cal/d, not nearly enough to meet the “18 in 4” objective. (Scott and his men also discovered that they were beaten to the South Pole by Amundsen, and then they died of cold and exhaustion on their return journey, one of the great tragic stories of polar exploration.) The greatest documented energy expenditure per day turns out to have been accomplished by a single athlete completing the cycling Race Across AMerica (RAAM); that individual actually burned an average of 18,000 Cal/d for the 9 days 16 hours it took him to cross the country (see *Int. J. Sports Med* 26:499–503, 2005). So, theoretically, if this individual could have completed this race without *any* calorie intake, he could have lost 18 pounds in 4 days! (As it turns out, he actually did lose 5 kg--more than 10 pounds--in his 10 days of racing. And by the way: the record for this race is a remarkable 8d, 10 h for a 3100 mile race.)

So, the message here is that, not surprisingly, there are a lot of exaggerated claims out there about the effectiveness of various diet plans. But how effective are “real” diet plans?

A number of clinical trials have been published in recent years that examine this question. For example: An article in the *New England Journal of Medicine* in 2008 (vol 359, pp. 229 – 241) compared the effectiveness of a low-fat, a low-carbohydrate, and a Mediterranean diet intervention (~1800Cal/d intake, with some increase in physical activity). After 2 years, participants on all 3 diets lost weight, with the Mediterranean and low-carbohydrate diets slightly better than the low-fat diet. Note, though, that the shift in calorie balance in these dieters would have been several hundreds of Cal/d (fewer Cal in, more Cal expended); at that rate, one might have expected a pound of weight loss every couple of weeks. But even the best results amounted to just 5 kg (11 pounds) of weight loss after 2 years, and in fact body weight *increased* and then, mostly, stabilized between months 5 and 24 of the diet (check out figure 2 in the article). This finding illustrates the frustrating fact that the body appears to compensate for changes in calorie balance. A recent report in the *Journal of the American Medical Association* (“Vol. 63, pp. 65-66, “Extra Calories Cause Weight Gain—But How Much?”) reinforces this message. One might think that, all other things unchanging, simply reducing intake by 140 Cal/d (drinking one less 12-oz. Coke per day) would result in loss of 4000 Cal (one pound of fat) each month or so. Unfortunately, that JAMA article re-confirms the ability of the body to compensate (somehow) for small changes, so that a lesser intake is balanced by less expenditure—and weight remains unchanged. The article concludes that individuals need to regularly re-assess and adjust strategies, and that, as a society, solving the “obesity epidemic” will require “more stringent regulation of the food industry, agricultural policy informed by public health, and investments by government in the social environment to promote physical activity.”

So what does all this add up to? I guess that I would have to come to two fairly obvious conclusions. First, losing weight is hard. Millions of people already know that, and scientists are working to figure out just why it’s so hard. And second when all else fails: eat less, exercise more!

Dr. David Goldstein



WSU Staff Points of Pride

Jacqui Neal received the “Learning Communities Award for Outstanding Innovation in Teaching” for the BIO 194 Honors Course.

Jacqui Neal, Jenny Papadakis, and Patti Roberts all received a certificate for “Commitment to Excellence in Learning Communities.” This certificate was given to those Learning Community Instructors who achieved outstanding ratings for overall student satisfaction. In order to receive this certificate, the instructor had to receive >90% satisfaction on their student evaluations and >90% class referral.

Congratulations to Jacqui, Jenny, and Patti for all their hard work and dedication to students!

2010 Biology Honor Graduates: DEPARTMENTAL HONORS

<u>Student</u>	<u>Advisor</u>
Jonathan Blaza	Dr. Bubulya
Ariana Bolan	Dr. Hartzler
Deanne Duval	Dr. Mamrack/Dr. Brown
Jacqueline Garrett	Dr. Hartzler
Matthew Hiskey	Dr. Miller
Todd Lewis	Dr. Sulentic
Sharon Ochs	Dr. Goldstein/Dr. Sulentic
Jennalee Post	Dr. Cambroner
Travis Rotterman	Dr. Alvarez
Kevin Sheehan	Dr. Hartzler
Kurt Throckmorton	Dr. Excoffon
Keisha Torres	Dr. Bubulya
Zach Vallandingham	Dr. Baird



GOOD LUCK WINTER 2010 GRADUATES: DEPARTMENT OF BIOLOGY

Joshua Byrwa	Jessica Olsen
Teresa De Witt	Brandon Park
Abigail Griest	Jennalee Post
Karen Guyton	Ashley Sawyer
Anna Holtvoigt	Whitney Steiner
Bradley Krick	Jessica Strauss
Andrew Krofft	Cody Sturgill
Abigail Marshall	Heather Tobias
Christine Molla	Chelsea Watts
	Nicholas Wyatt

You can watch commencement live online! The ceremony can be viewed live via video streaming on the Internet. The webcast is free, however, you must register with the Horizon League Network to view it.



CONGRATULATIONS WSU GRADUATES!



Spring Quarter Departmental Seminars

All seminars will be held at 1:30 on Mondays in 135 Oelman Hall. Students are strongly encouraged to attend.

March 29 th	Dr. Krane, Wright State University, Department of Biological Sciences
April 5 th	"Linking ecological niches and geographical distributions in a synthetic view of species-level biogeography" Dr. Peterson, Kansas University
April 12 th	"Beyond the birds and the bees: Molecular insights about the making and evolution of fruit fly sexually dimorphic traits" Dr. Williams, University of Dayton
April 19 th	"Browning of the waters: Do terrestrial carbon subsidies alter aquatic ecosystem stability?" Dr. Lennon, Michigan State University
April 26 th	Dr. Inman Hosted by Dr. Krane
May 3 rd	"Locus coeruleus and ventilatory chemoreflex" Dr. Gargalioni, Sao Paulo University
May 17 th	"Jumping to conclusions: Developmental insights into metabolism and locomotion" Dr. Kirkton, Union College
May 24 st	"Does aging stop?" Dr. Mueller, University of California-Irvine

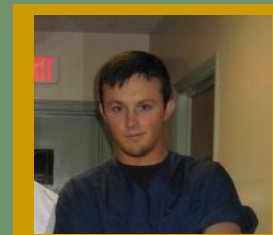


Featured Students

Travis Rotterman: Travis Rotterman, who works in the Freshman Biology Labs and also conducts research with Dr. Alvarez, has learned that he was accepted into a few different summer research programs in the field of neuroscience. Travis selected the program at the University of Rochester where he will be working with Dr. Mayer-Proschel, whose area of research is glial cell biology of the developing vertebrate central nervous system.

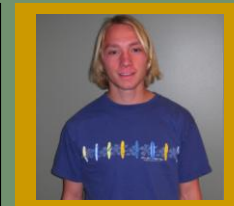


Kyle Leggett: Kyle Leggett, who works in Dr. Goldstein's Lab, has been accepted to a summer research program at Johns Hopkins University. He will be working in pulmonary medicine and asthma in the Division of Pulmonary and Critical Care Medicine. His research will consist of Fluorescent Imaging, Immunoblots, PCR, Histopathology, and Asthma Epidemiology. Also, he will be able to do rounds with the medical residents to experience the clinical atmosphere.



Mary Runkle: Mary Runkle was named the 2010 Miami Valley Academy of Family Physicians Premedical Student of the Year. Each year one individual from WSU is chosen for this honor. Mary is a Biological Sciences major and currently works as a Calculus Laboratory Teaching Assistant and volunteers as a 4-H advisor and camp counselor for teenagers. She has been accepted to a number of different medical schools. Mary received the award and a \$500 scholarship.

Kurt Throckmorton: Kurt Throckmorton, who works in Dr. Excoffon's Lab, was accepted to several Ph.D. programs including The Ohio State University, the University of Cincinnati, and the University of Wisconsin. He is intending to pursue his Ph.D. in genetics and is considering the offers from all of these great programs.



Kevin Sheehan: Kevin Sheehan is an undergraduate honors student who works in Dr. Hartzler's lab. Kevin learned that he is a finalist for the David S. Bruce Award for Excellence in Undergraduate Research, which is awarded annually by the American Physiological Society in association with the annual Experimental Biology meeting. In April, Kevin will give a presentation at the Experimental Biology meeting in Anaheim, CA.



Shelly Cotterman: Shelly Cotterman is a recent graduate of the Bio master's program from Dr. Kenyon's lab. She was accepted, with support, to Vanderbilt University's Ph.D. program in Science Education. Congratulations Shelly!



Mark Your Calendars!

Spring Quarter Schedule:

March 29	Spring Quarter 2010 Classes begin
April 5	70% refund period begins
April 13	Last day to withdraw for 70% refund
April 16	Last day to drop a class without a grade
May 14	Last day to drop a class with a "W"
May 31	Memorial Day, University closed
May 25	Last day to apply for August graduation
June 65	Last day of Spring Quarter classes
June 7-12	Final Exams for Spring Quarter

ATTENTION STUDENTS:

NEW SUMMER COURSES

BIO 213: Molecular Biology Lab
Summer B Term
2-week course
Aug. 2nd-13th
9:00 – 3:30 p.m.
Monday- Friday

BIO 305: Animal Physiology

Women in Science Giving Circle

The WISGC will award **three \$1,500** scholarships to WSU undergraduate women currently enrolled in STEM disciplines. Applications are due by 5:00 p.m. on Monday, **April 19, 2010** and to be returned to Bobbi Skipton in 106 Oelman.

Graduation Approval



If you are planning on graduating after summer or fall quarter, please see an advisor for graduation approval. Application filing periods:

Summer Graduation
Fall Graduation

March 2-May 25
May 26-August 21

Wright State University

Need Advising? If you need to schedule an appointment with an advisor, please call 775-4226 or e-mail bioadvising@wright.edu. Make sure to include the name of the advisor of wish to meet with, along with your availability.

Undergraduate Degrees:

Jacqui Neal
Patti Roberts
Courtney Smith

Graduate Degrees:

Laura Buerschen

Clinical Lab Sciences:

Bev Schieltz & Cheryl Conley

Department of Biological Sciences

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The BioLogue is a quarterly student newsletter that contains important information for students in the Department of Biological Sciences. If you have ideas for the newsletter, please suggest them to Courtney Smith at courtney.smith@wright.edu

