Greetings From Your President .................................................. 3
Sandy Lewis

EDU-Snippets
Solidsly Practical Snippets .............................................................. 4
Roberta Meehan and Richard Faircloth

Educational Issues
Giving Students the Ultimate Answers ........................................... 6
Eugene E. Harris

Teaching Tips
Use of On-line Practice Quizzes Enhances Student Performance in Anatomy & Physiology .................................................. 10
Jerry D. Norton and Andrew N. Clancy

General Models in Histology ........................................................ 11
Nina C. Zanetti

HAPS 2004 In Review
Review of Update Seminar #3: Medical Education on the Anatomical Sciences: The Winds of Change Continue to Blow ....................... 15
Craig Clifford

Patricia S. Bowne

Malapoops
New A&P Bloopers ................................................................... 17
Ken Saladin and Roberta Meehan

Past, Present, and Future of www.hapsweb.org .............................. 18
Carl J. Shuster

Thanks to Paul Krieger for his artwork on the cover of this issue of HAPS-Edumaticator. Paul is a very active member of HAPS. He is Chair of the HAPS Cadaver Use Committee and is on the faculty at Grand Rapids Community College in Grand Rapids, MI.
HAPS-EDucator is the official publication of the Human Anatomy and Physiology Society (HAPS) and is published four times per year. Major goals of the Human Anatomy and Physiology Society are: to promote communication among teachers of human anatomy and physiology in colleges, universities, and related institutions; to present workshops and conferences, both regional and national, where members can obtain information about the latest developments in the health and science fields; and to encourage educational research and publication by HAPS members. HAPS was established in 1989.

Annual membership dues are $50 for full time faculty, and $35 for part time and retired faculty. Annual membership renewals shall be due on January 1, April 1, July 1, or October 1. New members shall renew on whichever date most closely follows the date of their initial membership. HAPS Hotline: (800) 448-HAPS (4277). Information on membership, meetings, and more! Send correspondence to: HAPS, 8816 Manchester, Suite 314, St. Louis, MO 63144. Check out our new webpage at: http://www.hapsweb.org/

SUBMISSIONS TO HAPS-EDucator

Papers for publication, requests for information, positions available and wanted, and letters to the editor are welcomed. Articles may be submitted to the editor as an e-mail attachment or as a Microsoft Word or Word Perfect file or on 3.5” double density disks—please include a hard copy as a backup. If references are included, please follow the methods suggested in Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers. 6th Edition, Style Manual Committee (Council of Biology Editors) Cambridge, Cambridge University Press. 1994.

It is the policy of the Human Anatomy and Physiology Society (HAPS) that any advertising appearing in its publication(s) must be related to the teaching of anatomy and physiology. The HAPS-EDucator Editor and HAPS-EDucator Committee jointly determine whether an advertisement meets the criteria of HAPS. Any advertisement that is deemed not to meet the needs of the organization will not be printed, and the advertisement plus any monies collected from the advertiser will be returned. The opinions reflected in advertising that appear in this publication do not necessarily represent the opinions of HAPS. Advertisement of a product in the HAPS-EDucator does not represent endorsement of that product by HAPS. Contact the Editor for information on advertising rates, advertisement size and the procedure for submitting an advertisement to HAPS-EDucator for publication.

DEADLINES FOR SUBMITTING MATERIAL TO HAPS-EDucator: April 15 (Summer issue); August 1 (Fall issue); November 1 (Winter issue); February 1 (Spring issue).

CONTACT THE HAPS-EDucator Editor: Susan Baxley, Troy University Montgomery Campus, College of Arts & Sciences, P.O. Drawer 4419, Montgomery, AL 36103-4419, (334) 241-5473, (334) 241-8665 fax. sbaxley@troyst.edu
It is my pleasure to announce that Affiniscape has been chosen and hired as the new HAPS website management company. Your Board of Directors, together with Carl Shuster (Web Editor), Tom Lehman (Web Committee Chair), and Tonya Ferguson (HAPS Headquarters) spent much of the summer comparing the detailed options offered by our three web company finalists. Following much study and debate, we selected Affiniscape. By the time you receive this publication, you probably will have seen the results of the hard work that Carl and many others have put into making our website the best it can be. I am not going to elaborate in this letter on the many valuable functions that our new website provides; rather, I encourage you all to discover them for yourselves. Go to www.hapsweb.org and check it out, if you have not already done so!

There continues to be extremely high levels of activity in all areas of our organization. Some of the HAPS hot-spots of activity include: recruitment of new members, updating of our curriculum and instruction document, development of a cadaver-use survey, editing and updating of the Policy and Procedures Manual, finalizing the first HAPS laboratory safety document, expanding partner relationships, marketing outreach, web site development, planning the 2006 Annual HAPS Conference (Austin, Texas) and, of course, the final planning stages for our upcoming 2005 Annual Conference in St. Louis, coordinated by Margaret Weck.

Your Board of Directors and Steering Committee will meet for the annual, midwinter business meeting in January (this year in St. Louis), to address a long list of agenda items and issues, some of which the Board has successfully addressed during its monthly electronic meetings. Once our new website is fully operational, you will be better able to follow and, in some cases, participate in committee activities. HAPS needs your ideas. If you are not already active on a HAPS committee, consider contacting a committee Chairperson or your Regional Director for information on how you can become more involved. Contact information for Committee Chairs can be found just inside the back cover of this publication. You might also consider hosting or co-hosting a Regional Conference. There are many helper bees in HAPS eagerly waiting to help you make your Regional Conference a grand and rewarding experience for you, all the participants, and for your institution!

This year we are actively recruiting new members and have begun our first international outreach effort in an attempt to spread the word about HAPS to our colleagues around the world. Our President-Elect, Ric Martini, is taking charge of this effort, and has already begun plans to stretch HAPS into the South Pacific and even some areas of Europe. It is exciting to think that some day we may publish our HAPS-EDucator in many different languages (how is that for positive thinking?) If you have contact with colleagues in other countries, please let us know so that we can get information about HAPS to them. It is also easy for everyone to direct potential members to our website!

As our discipline takes center stage in healthcare education, and our organization matures, HAPS will have an increasing number of opportunities to influence A&P educators. Indeed, this is an exciting time to be an A&P educator, and I sincerely hope you will have the opportunity to share that excitement first-hand with your HAPS colleagues in St. Louis, Missouri, May 28-June 2, as we meet for our 19th Annual HAPS Conference and Workshops. If you have never attended a HAPS conference, you should seriously consider doing so. I am certain that you will find it to be the most professionally rewarding, friendly, and enjoyable conference you have ever attended. You will have an opportunity to meet A&P colleagues, authors, and researchers in our field, and you will bring back a plethora of information to enhance your classes and your programs. Your HAPS leaders and Annual Conference Coordinators work diligently to help keep the cost of attending our annual conferences reasonable. Nevertheless, it does cost money to attend a conference, so I encourage you to seek funding support from your institutions, and remember that, since many of us teach in programs that support allied health science students, it is sometimes possible to receive some funding assistance from the professional-technical area of your college as well as from academic professional development funding sources.

Because of the passion of our members for HAPS and the teaching of anatomy and physiology, we sometimes find ourselves polarized on some of the issues with which we struggle and debate within our various committees. However, the one thing I have observed during my presidency, thus far, is the overwhelming unity and dedication toward our mission - “promoting excellence in the teaching of human anatomy and physiology.” Thanks to all of you who work so hard toward our mission. Wishing you each a wonderful winter!
EDU-Snippets is a column designed to let you, the members of HAPS, share your personal or institutional educational experiences. So, here are this edition’s contributions!

For the sake of column continuity, we have done a bit of editing. We have also avoided quotation marks (except in-text). However, we think everyone will be able to tell where our introductions and commentaries leave off and where our contributors’ words begin. We have also used a modified outline format to help with the organization.

In this issue we have tried to stress the use of solidly practical ideas for your classroom or laboratory. Some of these ideas have been presented in different forms in previous EDU-Snippet columns. We did not have as many contributions this time as we usually have. However, we think you will find these EDU-Snippets to be solidly practical!

I. Nervous Ideas

A number of our contributors had some great ideas for discussing or demonstrating aspects of the nervous system.

A. Orange Ideas

Teri Trendler (Passadena College, CA, TATrendler@pasadena.edu) uses an orange for visualizing the CNS lecture. The rind or peel forms the dura mater while the “white gunk” is the arachnoid. This “white arachnoid” has a noisy rip as it is separated from the other parts of the orange. This rip also helps to demonstrate that the arachnoid holds the slices of the orange together. In addition, the thin transparent membrane skin on the slices clarifies the meaning of the pia mater. The slices themselves are the gyri. If you use real oranges, when you are finished with the demonstration, your lunch is ready for you!

B. Potentially a Membrane

Meanwhile, Betsy Ott (Tyler Junior College, TX, bott@tjc.edu) was thinking about how to demonstrate this illustrative concept of the membrane potential. So, she told us....

As an active learning exercise to demonstrate membrane potentials and saltatory conduction, I printed parts of a unipolar and a multipolar neuron, complete with sensory dendrites, axonal terminals, and lots of myelinated segments, on separate sheets of 8-1/2 x 11 paper. I brought the sheets to class along with tape and Post-It® note pads.

I had the students identify and assemble the parts of the sensory and motor neurons in correct order on the wall. I then positioned a student, with a Post-It® note, at every point that would be electrically active (sensory dendrites, each node of the myelinated sensory nerve fiber, multipolar soma at the sensory axonal terminals, etc.). Each student had to draw, on the Post-It® note, the graded (local) or action potential for that particular position AND the student had to draw it at the right moment.

We started at the sensory nerve ending (as I tapped the first student on the arm). This student graphed a generator potential; as it reached threshold, the student at the nearby trigger zone started graphing the action potential, then each succeeding student in turn started his or her graph. Students understood the concept of threshold and the concept that action potentials occur at each point along the membrane. Next time, I’ll add the secretion of neurotransmitter.

If I had more students and more time, I would love to get a whole neuronal pool functioning!! Think of the electricity!!!!

C. Telescoping the Contraction

Mike Glasgow (Anne Arundel Community College, MD, msglasow@aacc.edu) had an idea for visualizing the points and sub-points of a muscle contraction.

I usually carry a telescoping pointer while I am teaching and have, on occasion, found myself employing it to demonstrate the interactions of calcium ions, troponin, and tropomyosin to initiate the sliding of filaments during muscle contraction.

Letting my left arm represent the actin filament with myosin attachment sites along its length, I support the pointer along the forearm’s length to represent the position of the tropomyosin covering the attachment sites. Then, cupping my right hand with my thumb touching my left forearm (the myosin) and the tip of my fingers touching the pointer (tropomyosin), I let the knuckles of my metacarpophalangeal joints represent calcium binding sites. From this position, it becomes easy to flex the joint in response to the attachment of hypothetical calcium ions with their binding sites. The demonstrated movement naturally rolls the tropomyosin (pointer) away from the myosin attachment sites on the actin, thus giving the myosin cross heads access to the actin.

EDU-Snippets - continued on page 5
II. Bloody Thoughts

HAPS members sent us a number of ideas and continuations of previous ideas for working with blood vessels!

Mary Lou Percy (Navarro College, TX, marylou.percy@navarrocollege.edu) sent us this Snippet.

You can trace the blood vessels with yarn using red yarn for arteries, dark blue yarn for deep veins, and light blue yarn for superficial veins.

Meanwhile, Pat Bowne (Alverno College, WI, Pat.Bowne@alverno.edu) added to the circulatory idea in the following way.

We use licorice whips for the circulatory system and have students build a model of the peripheral circulatory system on newsprint.

III. Contractually So

Muscles are always a conflagration of additions and subtractions and so Ruth Young (North Essex Community College, MA, ryoung@necc.mass.edu) wrote:

One thing I have done to help the students understand the muscular system is to have them tape crepe paper “muscles” to a skeleton. If you have different colors of paper, you can differentiate flexors from extensors, abductors from adductors, and so forth. The students really enjoy this activity, and it really reinforces origins and insertions much more than the muscle models do.

IV. Ribosomes → 40 + 60 = 80

Have you ever had trouble explaining ribosomal subunits and mathematical inconsistency to your students? Well, Mary Bracken (Trinity Valley Community College, TX, bracken@tvcc.edu) has a great idea!

To demonstrate the two subunits of a ribosome and how a 40S and a 60S subunit come together to form an 80S ribosome, I get two balloons. I blow one up larger than the other and then I hold the two balloons up, touching each other while I apply some pressure. This will “squeeze” the two balloons. This will also show that while each balloon occupied a certain volume, when the balloons are pushed together they actually occupy less volume than when they are separate. Hence 40S + 60S=80S. And the students understand the concept!

V. Endocrine Thoughts

Pat Bowne (Alverno College, WI, Pat.Bowne@alverno.edu) had a great idea for demonstrating the insulin/glucagon interaction.

This activity requires three or more students, a bag of beans, small objects like beads or dyed beans of two colors, and a set of pop beads.

The pop beads represent glucose molecules. The bag of beans should represent the blood.

One student is the endocrine pancreas and is given the dyed beans. These beans represent insulin and glucagon. A second student is a liver cell and has some of the pop beads, which must be popped together to form the storage compound glycogen. The third student is a muscle cell, which wants to pick up glucose from the blood. If a fourth student participates, that student could be a GI tract cell, breaking down complex carbohydrates (strings of pop beads) into glucose and absorbing them into the blood. (If you want to deal with what happens to indigestible compounds, you could glue some of the pop beads together.)

Step 1: Glucose is added to the blood. At this point, students should discuss what would be a normal level of glucose in this blood and determine what will count as high glucose and what will count as low glucose levels in a blood sample.

Step 2: The pancreas samples are added to the blood. If glucose levels are high, the pancreas adds insulin to the blood; if glucose levels are low, the pancreas adds glucagon.

Step 3: The liver samples the blood. If insulin is present, the liver removes glucose from the blood and stores it. If glucagon is present, the liver adds glucose to the blood. When insulin and glucagon affect the tissue, they are removed from the circulation.

Step 4: The muscle cell samples the blood. If insulin is present, the muscle cell can take up some glucose and use it for activity. If not, the muscle cell cannot take up the glucose. Again, when insulin and glucagon affect the tissue, they are removed from the circulation.

Repeat these steps for a few rounds, until the students have seen how the pancreas deals with both a glucose load and a lack of glucose. The students should be able to write out a statement about what happens in each situation.

VI. And We Hope You Will…..

Keep those cards and letters coming! We thank you for your EDU-Snippet contributions. The next deadline is February 1, 2004, so if you could get your contributions in significantly before that, we would really appreciate it. Submit your ideas now and maybe you too will see your EDU-Snippet in print!
Giving Students the Ultimate Answers

Eugene E. Harris, PhD
Department of Biological Sciences and Geology
Queensborough Community College
City University of New York
Bayside, Queens 11364
Eharris@qcc.cuny.edu

Are we answering student’s questions?

Many of my students are nurses and many are women. Naturally, many cringe when they hear about the pain that accompanies childbirth. They ask, “Why?” A direct answer to the question is that the fetus’ head is very large and the mother’s birth canal has a diameter only slightly larger. The birthing process is therefore painful for the mother, complicated for the doctor to manage, and stressful for the fetus. Frequently doctors opt for a less complicated delivery route via Caesarian section.

Some students remain unsatisfied, “But why isn’t the birth canal bigger?” and “Why isn’t the human birthing process less complicated and distressing?” The answers to these questions are rarely given in our classes and texts. Consider the following:

Over the past 2.5 million years human brain size (and hence cranial size) has increased to such a degree that our heads are proportionately much greater in size compared to other primates. The evolutionary benefits of a larger brain are obvious. To accommodate the passage of such large heads, the female pelvic inlet and outlet have enlarged, creating the telltale anatomical differences we observe between male and female pelves. But there is a limit to such enlargement due to another unique human adaptation – bipedal locomotion. If females were to enlarge the birth canal any further, bipedal walking would become inefficient due to an increasingly suboptimal working orientation of the muscles that ensure hip stabilization (i.e. abductor medius and minimus). Thus, the design of the pelvis has been an evolutionary compromise between two competing human adaptations that has led to the obstetrical difficulties of human birth.

Which explanation is better, the first, or the second? Both are right and both are necessary, yet it should be recognized that they assume quite different biological perspectives. Ernst Mayr, the eminent evolutionary biologist, has described the basic difference between the two explanations. The first is a proximate explanation. It explains the immediate mechanical circumstances that make human birthing complicated. It also describes mechanisms that facilitate birth despite the tight passage, for example, the loosening of the ligaments of the pubic symphysis by the hormone relaxin. The second response is an ultimate explanation. It explains the evolutionary circumstances that have led to human obstetric difficulties. It also illustrates an important general evolutionary principle: that, while operating to optimize designs and physiological processes, natural selection has often had to compromise between different adaptations. What a pity it is that, inherent in our bipedal behavior, there is a simultaneous constraint imposed on future increases in brain size (see endnote). Can you think of other examples of human biology—of imperfect designs, processes, or disease—that can be explained in this way?

Genetic Disease

Now, we can consider ultimate explanations for some genetic diseases. Let us take sickle cell disease as an example. Around 1 in every 600 births of African Americans is to a child with sickle cell disease. A student asks, “Why is there sickle cell disease?”

The immediate explanation is that a person with sickle cell disease has inherited a mutation causing an amino acid change within the beta hemoglobin chain. Instead of glutamic acid at the sixth amino acid position, valine is present. This mutation usually has the effect of causing red blood cells to become sickle or crescent shaped. When a child inherits this mutated gene from both parents, this child will normally develop sickle cell disease. As a consequence, blood blockage may develop in peripheral capillary networks due to the abnormally shaped cells, and serious secondary consequences can ensue. Without intensive medical
Sickle cell disease is an example of a disease caused by a gene that can also have beneficial effects. The sickle cell gene is found at highest frequencies in tropical Africa where up to 40% of the population possesses it. Interestingly, the disease malaria, caused by the *Plasmodium* parasite, has a geographic distribution in Africa that almost exactly matches the distribution of the sickle cell gene. Heterozygotes for normal hemoglobin suffer high mortality from malaria, while homozygotes for the mutated beta hemoglobin suffer very high mortality in childhood from sickle cell disease. In contrast, heterozygous individuals, having both normal and sickle cell hemoglobin types, enjoy a survival advantage. This is because their red blood cells impede the growth and multiplication of the malaria-causing parasite. Thus, despite causing sickle cell disease in homozygotes, the sickle cell gene is maintained because it confers an advantage to heterozygotes in areas where malaria is endemic.

This ultimate explanation is based on two important and related principles with which our students should be familiar. The first is heterozygote advantage, whereby individuals who inherited non-identical alleles at a given gene locus enjoy a fitness advantage over individuals who have inherited identical genes at that locus. And the second is, balancing selection, whereby natural selection has maintained, within a population and through evolutionary time, two different alleles at high frequencies. It has maintained the two alleles because heterozygotes live longer than homozygotes for either the normal or mutated allele.

Students should also recognize that an individual’s relative fitness is realized only with respect to the environmental conditions in which that individual lives. Thus, heterozygotes for the sickle cell gene living in the United States, where there is little or no malaria, have no fitness advantage. As expected, the frequency of the sickle cell gene is slowly declining amongst African-Americans.

Similar explanations underlie other hematologic disorders such as alpha and beta thalassemias, Hemoglobin E (Hb E) syndrome, and Glucose-6-phosphate dehydrogenase (G6PD) deficiency. These disease genes are also maintained at high frequencies, however, especially in Southeast Asian or Mediterranean populations. As with sickle cell, these genes also confer a selective advantage (usually via heterozygous advantage) against the types of malaria common to these areas. Given the recent high immigration of peoples from these populations to the United States, it is not unlikely that our students will treat patients with these disorders.

Thus, along with details of the proximate explanations for these diseases, students should be familiar with the ultimate explanations.

The relatively common genetic disease, cystic fibrosis, seems to have a similar ultimate explanation. However, in this case, any selective advantage was conferred to individuals in the context of past environmental conditions. Evidently, heterozygotes for this disease gene gained at least some resistance to infectious diseases (e.g., tuberculosis and/or typhus) that plagued regions of Europe in previous times. Thus, natural selection has shaped at least some of our genes to past environmental conditions. It is natural then for us to wonder, to what extent are our genes shaped by past environments?

### The Importance of Past Environments

According to evolutionary theory, we can predict that our genome, and the homeostatic systems for which it codes, evolved to perform optimally with respect to the lifestyle pattern by which we lived for millions of years—hunting-gathering (though this varied with season and latitude). This is particularly so for peoples living in Western societies where lifestyles have changed so recently and dramatically. Interestingly, current research seems to support these predictions indicating that our bodies are generally adapted to a lifestyle in which diets were high in protein and fiber and in which calories were readily consumed through high levels of activity. The chronic diseases that plague individuals living in modern societies (e.g., hypertension, obesity, type II diabetes, arteriosclerosis) are rarely encountered in individuals from societies maintaining traditional ways of life. Therefore, we might refer to these diseases, rather more aptly and ironically, as the “diseases of civilization.”

### Symptoms as Evolved Defenses

Understanding the body’s non-specific defenses is essential, yet these defenses are often presented as features of illness that need to be treated. Thus, fever, coughing, sneezing, inflammation, vomiting, and diarrhea are ways the body has evolved to defend itself, most often against dangerous pathogens. Some of these defenses have been so important to survival that neural reflex systems or hormonal feedback systems have evolved to control them.

When pathogens are involved, however, a ‘defense’ interpretation of these clinical symptoms becomes awkward since pathogens sometimes actively manipulate our defenses for their own growth, reproduction, and spread. From an evolutionary perspective, we predict that pathogens and their hosts will continuously evolve strategies and counterstrategies in the endless arms race between them. Given this, a physician would ideally want to distinguish between cases in which defense responses actually benefit the patient and those cases in which ‘defenses’ have been manipulated to serve the pathogen. For example, diarrhea can be either a defense or a manipulation depending on the specific pathogen. Let us take *Shigella* bacteria that cause severe diarrhea. One study found that treatment of individuals with anti-diarrhea medication prolonged their illness compared to a group left untreated. In this case, diarrhea seems to act as an actual defense. However, the bacteria *Vibrio cholerae* carry...
Educational Issues - continued from page 7

...evolved a life history pattern in which young are born in a relatively premature state with relatively smaller brains compared with other primates. Human brain growth then proceeds postnatally for a longer period of time. Second, other contributing factors that complicate the birthing process are likely due to changes in lifestyle and reproductive patterns in today's women as compared to our ancestors. These include higher incidence of obesity in mothers, greater age of mother at first birth, smaller stature, size, and decreased activity levels.26

References
8 Allison AC. Two lessons from the interface of genetics and medicine. Genetics 2004;166:1591-1599.

Endnote
There are two additional points relevant to an ultimate explanation. First, to lessen the evolutionary constraint, humans have evolved a life history pattern in which young are born in a relatively premature state with relatively smaller brains compared with other primates. Human brain growth then proceeds postnatally for a longer period of time. Second, other contributing factors that complicate the birthing process are likely due to changes in lifestyle and reproductive patterns in today's women as compared to our ancestors. These include higher incidence of obesity in mothers, greater age of mother at first birth, smaller stature, size, and decreased activity levels.

Chakravarthy MV and Booth FW. Eating, exercise, and “thrifty” genotypes: connecting the dots toward an evolutionary understanding of modern chronic diseases. J Appl Physiol 2004;96:3-19.


Palumbi SR. Humans as the world’s greatest evolutionary force. Science 2001;293(5536):1786-90.

Use of On-line Practice Quizzes Enhances Student Performance in Anatomy & Physiology

Jerry D. Norton
Biology Department
Georgia State University
biojdn@langate.gsu.edu

Andrew N. Clancy
Biology Department
Georgia State University
bioanc@panther.gsu.edu

Undergraduate students in Allied Health professions often have difficulty with the analysis and interpretation of complex biological phenomena. Many students seem to be concrete learners who prefer practical, hands-on experience as their method of learning.

Recently, we developed a bank of On-Line WebCT (Web Course Tools) Practice Quizzes for Human Anatomy & Physiology (A & P) that students were required to answer as lab homework assignments. Anatomy & Physiology lecture instructors took approximately thirty sample test questions from each of the assigned lecture chapters and put them into a database on a lab web site. Each practice test consisted of a bank of approximately sixty test questions. Six on-line practice tests were constructed over the course of a semester. Students were asked to take two practice tests for each of the three blocks of lab material.

Since lectures and labs were closely sequenced, this allowed for timely feedback of student progress. Each Practice Test consisted of 20 randomly selected questions (from the bank of sixty), and these were given to students in a multiple-choice format. Practice test #1 consisted of questions covering the first two chapters of the lecture textbook; Practice test #2 covered the next three chapters of the text, etc. Students were allowed 60 minutes to complete each practice quiz and could use whatever resources they needed.

To receive credit for the lab homework assignment, students had to score at least 70% on each of the two practice quizzes. Students were allowed up to three attempts to complete each practice quiz. For ease in recording, two Practice Quizzes were handed in when students took each of the 3 lab exams.

The results of our use of on-line quizzes have been remarkable. The mean average on our lecture exams improved by approximately one-half of a letter grade on each of the lecture exams over the course of the semester. Students who took the practice quizzes were better able to anticipate the types of lecture test questions they might be seeing. Many students reported that they were less anxious on exam days. Lecture examination questions consisted of a mixture of novel test questions and those taken from the bank of on-line practice tests.

Students became more actively involved in the Anatomy & Physiology course. Students frequently consulted their instructors regarding their practice test results. This increased their understanding of course concepts.

In semesters prior to the implementation of the on-line practice tests, lab homework assignments had been instituted. These homework assignments helped students familiarize themselves with basic terms and concepts, but these assignments did not have the same beneficial effect as did the practice exam questions. As stated, the use of on-line practice tests resulted in a mean student outcome improvement of half a letter grade.

The following data are illustrative of our success in incorporating on-line practice tests into the curriculum. The means of the primary lecture exams in our first semester Human Anatomy & Physiology course over the course of a semester are shown before and after the implementation of the on-line practice quizzes.

<table>
<thead>
<tr>
<th>BIOL 1110 (A&amp;PI) Norton</th>
<th>Exam Means Before (Summer 02)</th>
<th>Exam Means After (Fall 02)</th>
<th>Points Gained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>72.0</td>
<td>79.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Exam 2</td>
<td>77.4</td>
<td>80</td>
<td>2.6</td>
</tr>
<tr>
<td>Exam 3</td>
<td>74.1</td>
<td>78</td>
<td>3.9</td>
</tr>
<tr>
<td>Exam 4</td>
<td>68.3</td>
<td>71.1</td>
<td>2.8</td>
</tr>
<tr>
<td>Average Points Gained</td>
<td></td>
<td></td>
<td>+ 4.3</td>
</tr>
</tbody>
</table>

HAPS-EDucator - Winter 2005 - page 10
Teaching Tips - continued from page 10

<table>
<thead>
<tr>
<th>Exam Means Before (Spring 02)</th>
<th>Exam Means After (Fall 02)</th>
<th>Exam Means After (Fall 03)</th>
<th>Points Gained Spring 02 vs. Fall 03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam 1</td>
<td>66.3</td>
<td>70.7</td>
<td>73.9</td>
</tr>
<tr>
<td>Exam 2</td>
<td>60.2</td>
<td>67.6</td>
<td>78.5</td>
</tr>
<tr>
<td>Exam 3</td>
<td>58.6</td>
<td>64.8</td>
<td>79.4</td>
</tr>
<tr>
<td>Exam 4</td>
<td>44.9</td>
<td>41.2</td>
<td>83.1</td>
</tr>
</tbody>
</table>

Average Points Gained (from Spring, 2002 to Fall, 2003) + 21.2
Average Points Gained for Instructors (Norton, Clancy) + 12.8

In the table above, the improvement in the pass rates for one instructor’s (Clancy’s) first semester A & P courses are shown before, immediately after, and one full year post-implementation of the on-line practice tests. The improvement in the overall pass rate for first semester A & P students who were exposed to sample exam questions was remarkable. The overall pass rate (As, Bs, Cs) increased from 48.4% in the Spring of 2002 to 73.7% in the Fall of 2003 (one year after implementation). Lecture exam questions before the implementation consisted of mainly instructor-derived questions while lecture exams after implementation consisted primarily of those derived from the test bank.

Students who took the on-line practice tests also became more active in lab and lecture classes and sought answers to on-line practice questions (since the correct answers to questions were not provided on WebCT). Students commented that the on-line tests helped them to better prepare for exams and reduced their overall anxiety. Both instructors saw an overall improvement in student exam averages of about one-half a letter grade and improved student success. The use of on-line practice tests as an essential part of the curriculum has numerous potential benefits: enhanced interactions between instructors and students, decreased student anxiety, and improved grades on exams.

General Models in Histology

Nina C. Zanetti
Department of Biology
Siena College
Loudonville, NY 12211
(518) 783-2455
zanetti@siena.edu

Histology can be a challenging subject for undergraduates, especially when the topic is presented as a small portion of a large A&P course. Like anatomy, histology can appear daunting because of the large number of seemingly unrelated facts. In addition, histology requires the student to grapple with interpreting microscopic images. One approach to helping students with these challenges involves presenting them with unifying themes or models.*

This article describes a number of models or general principles that can help students recognize recurring patterns in histological “facts,” build frameworks for organizing content, and use interpretation of visual (microscopic) images to reinforce understanding of physiological processes. Many of the principles are very simple, yet often overlooked or misunderstood by students. Moreover, it is the very simplicity of the concepts that makes them useful frameworks for understanding relationships between detailed information. The models are predictive; that is, they enable students to anticipate new information as they encounter it in the course. Instructors can use this predictive feature either to reinforce concepts in physiology or to help students develop their skill at identifying structures in microscope slides. Some additional applications of the models include: (1) practice in interpreting 3-dimensional aspects of microscopic structures, (2) using principles of histological staining procedures to reveal information about cell function, and (3) recognizing structure-function correlations at the cell and tissue level.

Teaching Tips - continued on page 12
The greater the surface area, the more efficiently the surface can carry out its function.

Increased surface area enhances any function that involves activity at a surface.

THE MODELS:

Model 1

Cells and tissues are 3-dimensional.

Because cells and tissues are almost always seen in two dimensions, it is, unfortunately, easy for students to fall into the habit of picturing them that way. Much confusion in interpreting slides can be avoided by repeatedly urging students to develop the habit of creating 3D mental images of structures. The 3D configuration often is related to function.

- Example 1: “The esophagus is a long hollow tube. Predict the shape of a cross section of this organ (circle).”
- Example 2: “Smooth muscle is made of spindle-shaped cells, arranged in overlapping arrays. Explain why a cross section through this tissue looks like a collection of circles of varying diameters.”

Model 2

Living tissues need a vascular supply.

All cells need oxygen and nutrients that circulate in the blood. In addition, cells need to get rid of waste materials by releasing them into the blood.

- Example 1: “The epidermis does not contain any blood vessels. How are the epidermal cells helped by the proximity of the dermal papillae (highly vascular connective tissue that projects up into epidermal layers)?”
- Example 2: “Predict the special needs and characteristics of cartilage, a tissue that is avascular (e.g., has a low metabolic rate, must have a matrix that permits diffusion, and therefore, dies when the matrix is calcified).”

Model 3

Increased surface area enhances any function that involves activity at a surface.

Many cellular functions, such as transport, absorption, and diffusion, involve movement across a membrane or other surface. The greater the surface area, the more efficiently the surface can carry out its function.

- Example 1: “The small intestine has many structural features that enhance surface area, such as microvilli, villi, and plicae circulares. Predict whether absorption is an important function of the small intestine.”
- Example 2: “Hepatocytes carry out many endocrine functions that involve exchange of materials with the blood. What structural modification do you predict is found on the side of the hepatocyte that contacts a liver sinusoid (and interacts with the blood in that sinusoid)?”

Model 4

Mitochondria are needed when tissues need a source of energy.

Since mitochondria synthesize ATP, cells that carry out functions requiring a large amount of energy will often have an abundance of mitochondria.

- Example 1: “In order to be streamlined for swimming, sperm cells carry only enough cytoplasmic ‘baggage’ as is essential for their function. Predict whether sperm cells contain many mitochondria.”
- Example 2: “Cells of the proximal convoluted tubule contain many mitochondria. Predict whether the reabsorption that occurs in this tubule involves diffusion only or active transport.”

Model 5

Properties of epithelium:

Epithelial tissues line spaces and cover surfaces.

- Example 1: “Predict the best place to look for epithelium in a microscope slide or image (look for holes or spaces).”
- Example 2: “Examine the structure of capillary endothelial cells. Predict a function of this tissue.”

The thickness of an epithelium relates to its function.

Thicker epithelia aid in mechanical protection, thinner types allow transport or secretion and the very thinnest epithelia facilitate diffusion.

- Example 1: “Predict which structure will have a thicker (stratified) epithelium: skin (subject to much wear and tear) or alveoli (site of diffusion of respiratory gases).”
- Example 2: “Examine the structure of capillary endothelial cells. Predict a function of this tissue.”

Model 6

Connective Tissue = cells + fibers + “jellies.”

The many diverse types of connective tissue all have this pattern of composition, with the variations in connective tissues all resulting from differences in the type and relative number of each component.

- Example: “Cartilage is a special type of connective tissue. Predict the components that make up this tissue including cells (chondrocytes), fibers (usually collagen), and “jellies” (GAGs, etc.).”

Model 7

Properties of continually renewing cell populations.

Some tissues are constantly turning over. Characteristically, these tissues have (a) cells with a short life span and (b) the need for stem cells (cells that can proliferate to give rise to more stem cells AND differentiated cells). Any continually renewing population should have these properties.

- Example 1: “Predict whether stem cells will be present in bone marrow (or in seminiferous tubules or epidermis).”

Teaching Tips - continued on page 13
Teaching Tips - continued from page 12

- Example 2: “What similar function is shared by the basal cells of the epidermis, the CFU-S (pluripotential stem cell) of bone marrow, and the spermatogonia of testis?”

Model 8
Functional significance of nuclear staining properties:

The transcriptional activity of a cell can be correlated to the appearance of the cell’s nucleus. Nuclear DNA exists as chromatin, which can be in the inactive or active (transcribing) state. Inactive chromatin (heterochromatin) stains darkly in light microscope (LM) or electron microscope (EM) preparations while active chromatin (euchromatin) stains lightly.

- Example 1: “Explain why the precursors of red blood cells have progressively more condensed, darker staining nuclei as they become more differentiated.”
- Example 2: “Which cell will have a lighter-staining nucleus, an inactive lymphocyte or an activated lymphoblast? Use your answer to explain why germinal centers stain lighter than the surrounding lymphatic tissue.”

Model 9
Histological properties of protein-secreting cells:

Ultrastructure. Cells that synthesize and secrete proteins all use the same basic secretory pathway of organelles: rough ER, Golgi, and secretory vesicles. Once learned, this pathway can be used to predict the ultrastructure of protein-secreting cells in diverse organs, such as plasma cells, pancreatic acinar cells, and chief cells of the stomach.

- Example: “Plasma cells synthesize and secrete antibodies, which are proteins. What organelles would you expect to find in abundance in a plasma cell’s cytoplasm?”

Functional significance of basophilic staining. Acid-rich substances stain with basic dyes and appear dark purple in standard preparations. This principle can be used to predict the LM staining properties and appearance of many cell components. For example, nuclei, which are rich in DNA, stain dark purple. Also, when combined with the knowledge of basic secretory pathways of the cells, this principle enables students to predict the LM appearance of any protein-synthesizing cell. These cells are rich in ribosomes, which are rich in acidic RNA and stain basophilically. Protein-secreting cells often show a “negative Golgi” with the membrane-rich structure not staining basophilic.

- Example: “Serous cells of parotid glands stain very basophilic. Predict whether their product is enzyme-rich or mucus-rich saliva.”
- Example: “Chief cells of the stomach make pepsin, an enzyme. Will the cells stain basophilically or acidophilically?”

Model 10
Histological properties of lipid-rich structures and lipid-synthesizing cells:

Ultrastructure of lipid-synthesizing cells. Lipid metabolism occurs on smooth ER membranes (lipids are not proteins, so synthesis does not require ribosomes). Therefore, cells that synthesize or metabolize lipids will be rich in smooth ER.

- Example: “The interstitial cells of the testis synthesize the steroid hormone testosterone. Since steroids are lipids, predict which organelle will be abundant in the cytoplasm of these cells.”

Staining properties of lipids and lipid-synthesizing cells:

Lipids are hydrophobic, whereas most stains and fixatives are hydrophilic. Lipid-rich structures, such as membranes, and lipid-synthesizing cells are lost during standard specimen preparation, and lipid-rich structures appear vacuolated or pale staining. In addition, lipid-secreting cells, which have abundant smooth ER and few ribosomes do not stain basophilically in standard LM preparations. Also, membranes of smooth ER do not stain well, hence another reason for the pale, vacuolated cells seen in LM images of lipid-synthesizing cells.

- Example 1: “The cells of the adrenal cortex are pale or vacuolated (“frothy”) in appearance. Predict what type of hormone (protein, steroid, etc.) these cells synthesize.”
- Example 2: “The myelin sheath of a nerve cell is composed of layered cell membranes made of lipid bilayers. Explain why this sheath is pale or invisible in LM images and why myelin-rich nerve tissue has a pale-staining, vacuolated appearance (as compared to muscle or connective tissue) with standard tissue stains.”

In conclusion, unifying models can help guide students through the task of learning histology. Although the above list is not intended to be exhaustive, in my experience these ten principles are the concepts that tend to come up most frequently in my histology course. While some of the models may be a bit more complex than is appropriate for the tissues chapter of an introductory Anatomy and Physiology course, my hope is that students will find the general approach of relating facts to unifying principles helpful in learning a microscope-intensive, morphological subject.

* The author would like to acknowledge Harold Modell for suggesting the idea of looking for models in histology and for encouragement in developing the ideas presented in this paper.

The content of this paper was presented in a workshop given by the author at the Annual HAPS Conference in 2003.
The turns of the past two centuries have been associated with landmark events in St. Louis. In May 1804, the Corps of Discovery (led by Meriwether Lewis and William Clark) left St. Louis on their historic mission to explore the newly acquired territory and to search for the fabled northwest water passage to the Pacific Ocean, returning to St. Louis in September 1806. In 1904, the 100-year anniversary of the Lewis and Clark Expedition was celebrated in St. Louis by the Louisiana Purchase Exposition (commonly called the World’s Fair). So why should the turn of this century be any different? For the second time in the organization’s history, HAPS is coming to St. Louis! Like the Missouri State Quarter, the HAPS’05 logo reminds us of our organizational history.

Conference registration forms, workshop proposal forms, poster proposal forms, a link to the conference hotel, and links to American Airlines and Avis Car Rental are now available on-line at the HAPS website (www.hapsweb.org) or from the HAPS office (1-800-448-4277). Early conference registration (before Jan. 28, 2005) gives you a discount on conference registration fees. As special events and speakers are confirmed, they will be added to the conference page.

St. Louis weather is highly variable in the spring and early summer, so we cannot say anything meaningful about what to pack until much closer to the conference dates. Whether you need your woolies or your short-sleeves, we hope you plan to meet us in St. Louis for the 19th Annual Conference of the Human Anatomy and Physiology Society May 28 through June 2, 2005.
Review of Update Seminar #3
Medical Education in the Anatomical Sciences:
The Winds of Change Continue to Blow

Richard L. Drake, PhD, presenter
Director of Anatomy
Cleveland Clinic Lerner College of Medicine
of Case Western Reserve University
draker@ccf.org

Craig Clifford, PhD, reviewer
Northeastern State University
611 North Grand Ave
Tahlequah, OK 74464
(918) 456-5511 x 38
(918) 458-2325 fax
Clifford@nsuok.edu

Richard Drake, who served at the University of Cincinnati College of Medicine for the past 22 years, was recently appointed as the director of the new Cleveland Clinic Lerner College of Medicine. The Lerner College admitted its first 32 students in July 2004. Drake’s responsibilities are to develop and implement the anatomy component of the medical school curriculum. In his presentation Drake reviewed the current state of teaching of the anatomical sciences at medical schools in the United States and described the radically different approach to be implemented at the Learner College of Medicine.

Among the wealth of statistical data presented was the fact that an average of 167 course hours is devoted to gross anatomy in surveyed medical programs in the United States. However, there is considerable variation among programs ranging from as few as 55 hours to as many as 252 hours. Similar variation can be seen in the number of hours devoted to microscopic anatomy, neuroscience, and embryology. These findings are from a 2001 survey of 141 allopathic and osteopathic medical schools. Drake is currently working with the Educational Affairs Committee of the American Association of Anatomists, in cooperation with the American Association of Clinical Anatomists, to continue updating and expanding data collection related to medical anatomical science education via a new on-line survey.

The second part of Drake’s presentation outlined the radically different approach to be tried at the Cleveland Clinic Lerner College of Medicine. Active learning strategies such as problem based learning, interactive seminars, laboratories, and on-line training resources will replace traditional lectures. Summers dedicated to basic and clinical research activities will lead into two years of integrated organ systems courses, referred to as case-directed anatomy. In addition to the non-traditional approach to teaching, mastery of performance standards will be the principal means of evaluation throughout this five-year program of medical education. Drake readily admits that the first ten years of this program and the time it will take for the first students to graduate from medical school and complete their residences, will be a learning experience during which many changes could occur. Whether this novel approach is able to produce physicians who have the skill as well as the desire to be investigators is yet to be seen.

Review of Update Seminar #7—Keynote Address
Breakthroughs in Cancer Research: Impact on Lab, Classroom, and Society

Randy Johnson, PhD, presenter
University of Calgary
President and CEO, Genome Prairie
RNJ@genomeprairie.ca

Patricia S. Bowne, reviewer
Alverno College
3401 South 39th Street
Milwaukee, WI 53234-3922
(414) 382-6207
(414) 382-6332
pat.bowne@alverno.edu

Forty percent of North Americans will be diagnosed with cancer during their lifetimes, and twenty-five percent will die of cancer. As a cause of death, cancer is exceeded only by cardiovascular disorders. Both the incidence and mortality of cancer increase by age. Consequently, the current generation ages in the next decade, the economic burden cancer places on North American countries, already nearing 15 billion dollars a year, will probably double.

When we look at the actual mortality rates from different cancers, though, the situation is a little less dire than these statistics would indicate. While lung cancer rates have increased over the past 30 years, mortality rates for most other cancers have decreased. Since the 1990s, the age-adjusted cancer mortality has actually decreased slightly and is now down to the level seen in the 1970s; this is not obvious to the public only because the decrease is offset by the increasing age of our populations.

How is this decrease in age-adjusted cancer mortality being accomplished, and can it be sustained and improved further? Much of the progress to date has come from advances in prevention, earlier diagnosis, and from improvements in the delivery and variety of therapies. We can hope for continued progress in all three areas.

As many as fifty percent of cancers could be prevented by the...
elimination of smoking, increased sunscreen usage, dietary changes, increased exercise, and improvements in hygiene and environmental quality. In addition, prophylactic supplements such as aspirin, antioxidants, and resveratrol may reduce cancer incidence. Resveratrol is a compound in red wine which induces the expression of sir2 genes, whose protein products modulate chromosome structure. In yeast, they depress the activity of a variety of other genes, producing life-extending effects that mimic those of caloric restriction. But lifestyle changes could be even more effective if they were tailored to individuals' genetic cancer risks. Molecular diagnosis is one of the keys to tailoring individual interventions. For instance, assays of EZH2 gene expression can distinguish potentially invasive breast cancers, which demand early aggressive therapies, from less invasive cancers that can be treated more conservatively. But molecular diagnosis based on gene assays is expensive and will probably have been replaced by diagnoses based on the measurement of the genes' protein products or on the byproducts of metabolic pathways, before it becomes inexpensive enough for general use.

What can we expect from these types of assays? We can expect diagnosis of not only individuals' genetic risk factors for specific cancers, but also their abilities to metabolize various compounds used in treatments. This would allow the oncologist to create prospective treatment plans, identifying the steps individuals should take at different times in their lives to reduce the risks of cancer. These might vary from something as benign as taking daily aspirin and vitamins to steps as extreme as having one's children early to allow for prophylactic mastectomy in early middle age.

Improved delivery of conventional chemo- and radiation therapies has improved survival rates of many cancers, but may be reaching the limits of its potential. Novel cancer treatments are being developed though. These treatments include the use of the p53 gene, growth inhibitors, and oncolytic viruses, all of which are being studied in Randy Johnson's, the presenter and CEO of Genome Prairie, laboratory.

The p53 gene, when inserted into cancer cells in vitro, can stop cell growth and trigger apoptosis. However, delivery is the main challenge facing this treatment in vivo. To be effective it must be delivered to 100% of the cancer cells, and although it has been in trials for the past 5-6 years, this goal has not been achieved. Of the growth inhibitors, angiogenesis inhibitors work well in mice but not in humans. Anti-growth factors, like anti-estrogen drugs and receptor inhibitors, have shown some promise for specific types of breast cancers. Oncolytic viruses appear particularly promising. These include adenovirus, vesicular stomatitis virus, herpes virus, and reovirus.

Reovirus is common in the human population at large, where it causes a minor infection of the mucous membranes, in particular the rapidly dividing cells of the intestinal lining. It appears to target cells which have activated the RAS cell division - signaling pathways. Inside these cells, the virus takes advantage of the activated cell division pathways to produce massive numbers of new virions, causing apoptosis and virion release into the surrounding region. Although this virus usually does not pass the mucous membranes and enter the body, five years ago it was reported to preferentially infect cancer cells both in vitro and in vivo and to cause tumor regression in mice.

Since then, reovirus has been tested in 12 dogs having cancer with 11 positive results and has passed phase 1 human clinical trials. It shows no negative side effects and is yielding positive clinical responses in phase 2 trials on seriously ill patients with breast, prostate, or brain cancers. Since success in cancer treatment is defined as 5-year survival, however, the final verdict on this treatment is years away.

With the combination of individualized diagnosis and risk assessments, a wide menu of preventative or prophylactic lifestyle changes available to target the individual's particular risks and promising new therapies already in clinical trials, the future of cancer treatment is by no means as hopeless as our experiences with cancer in our aging peers and parents may have led us to believe. Progress will have to be rapid and determined in order to have any effect on the massive increase in numbers of cancer patients to be expected in an aging population, but these new developments promise just such progress, as long as science educators continue to produce the researchers and society continues to fund the research that is bringing them to pass.
Teaching is a demanding profession, with its share of weariness and tedium. Not the least of the drudgery is grading exams, lab reports, and homework. Fortunately, although that point is debatable, test and homework grading has its moments of levity when a student so wildly miss-guesses at a word that the answer takes on an entirely new and humorous meaning. Thus, we present Malapoops II, the second installment of amazing bloopers in Anatomy and Physiology.

We do not include any of these misguided moments simply to poke fun at those who have made the errors. However, sometimes by listening to our students’ misconceptions, we can actually sharpen our own teaching and awareness skills.

In most cases the contributor provided only the student’s answer, which is indicated in boldface. We have made up the questions to put the answers in context. Quotation marks indicate annotations by the original contributors. For the most part, items are listed in the order in which most A&P textbooks and courses cover the topics. Contributors are identified by initials and named at the end.

I. At the Cellular Level and Below

1. Human cells are placed in a beaker of saline. They show no net gain or loss of water and, therefore, do not shrink or swell. Therefore, this saline must be hydrophallic to the cells. (KS)

2. A sequence of three mRNA bases that code for one amino acid in a protein is called a codeone. (KS) Sounded more like code blue to us.

3. The cells and fibers of loose connective tissue are embedded in a featureless gel called grand substance. (KS) Indeed they are!

4. “If I were to take this exam again I would most defiantly work on my math skills.” (PB) That defiance may possibly have been the original problem.

5. ATP stands for “adrenal triphosphate.” (PK) Medullary or cortical?

6. When asked to identify certain epithelial cells, one student answered, pseudosatisfied columnar epithelium. (RF) We were sorry to hear that some of the tissues were not completely satisfied.

7. We learned a great deal about the cell from this set of answers.
   a. "...the rough ER possesses rhizomes required for the production of enzymes etc...."
   b. "...the smooth ER... is comprised of tube like structures called tubeculae.” Not a bad neologism, actually.
   c. "...endoplasmic reticulum being near the nucleus helps to ensure that genetic expression is greatly interfered with.”
   d. "The nuclear pores consist of transmembrain protein allowing nutrients to flow into the brain and mRNA to flow out.” (LW) Sounds like a smart move there!

II. Integumentary Integrity

8. Skin cancer is one of the dangers of ultraviolet light. (AD) We knew those short little waves could get kind of nasty!

III. A Bony Problem

9. The navicular bone of the ankle is the “navigator bone.” (PK) We should all take a stand on this one.

IV. Contract—ually Yours

10. The long muscle that crosses the front of the thigh is the sagitarius. (CS) We wondered if tauruses had this sagitarius muscle.

11. Meanwhile another student in another school named the same muscle the sagitorius. (BR) But, that might be one of the major constellations.

12. A person who is physically active needs more water than a person who leads a sedentary lifestyle. (KS) We were wondering how porous this rock was.

13. A student wrote, “I am worried that I won’t be able to mesmerize all the muscles.” (EH) The brain muscles can certainly have that effect.
14. Cranial nerve X is also called the vegas nerve. (CE) We will bet on that one!

15. “I used to offer extra credit for inventing a clever mnemonic for the cranial nerves. One young lady offered one that began: ‘Orgasm, orgasm, orgasm...’ I asked her about it since it made little sense. She said she thought that’s how you spelled ‘organism.’” (AM) Give me an O; give me an O; give me an O, she said cheerfully!

16. The outermost of the meninx of the brain is called the alma mater. (EH) Is this what happens when one’s education goes to one’s head?

17. The pit in the retina on the optical axis of the lens is the phobia centralis. (GJ) That is a frightening place!

18. We learned that the optic nerves cross at the optic charisma. That must be what attractive people have.

19. For a question asking the students to describe the various leukocytes: for a lymphocyte, “the cytoplasm is semisecular.” (RY) Does that make the nucleus semireligious?

20. The EKG allows you to measure heart rate in “beeps per minute.” (PB) We are listening!

21. How about those very close veins? (RF)

22. One type of white blood cell is the basofiddle. (TN) Perhaps with a bow-shaped nucleus???

23. The tonsil located at the rear of the oral cavity is the philistine tonsil. (STB) Goliath, perhaps?

24. The air spaces connected to the nasal cavity are the paranoid sinuses. “Always was a bit suspicious about those air spaces.” (HR) Just because you are paranoid, it does not mean they are not really after you.

25. As the result of an automobile accident, a person might well suffer from a punctuated lung. (JS) We wondered if that were anything like punctuated equilibrium.

26. The process suspended from the rear of the soft palate is the vulva. (LS) This one left us hanging.

IX. Continuation of the Species

27. We learned that the male reproductive system has a corpora cassinova. (RF) We always suspected that.

28. Sperm are produced in the ovaries of the testes. (SLB) Hmm, hermaphroditism must be much more common than we thought.

29. The identity of that ovarian structure in the human female fetus is a pragmatic follicle. Actually, we thought that was a bit dogmatic.

30. What is the function of the vas deferens? A: To carry sperm to virginia. “Either this student was especially well-endowed or Virginia was in for a surprise that evening.” (DW) We think we will leave this one up to Virginia.

31. Actually, that is what there is between a man and a woman – a vas deferens. (RM) In all deferens....

Contributors: AD, Augustine DiGiovanna; AM, Alan Magid; BR, Bob Rawding; CE, Christine Eckel; CS, Carl Shuster; DW, David Woodman; EH, Elizabeth Harper; GJ, Gary Johnson; HR, Henry Ruschin; KS, Ken Saladin; LS, Larry Stewart; LW, Lee Weller; RF, Richard Faircloth; RM, Roberta Meehan; RY, Ruth Young; SLB, Sheri Boyce; STB, Susan Baxley; TN, Ted Namm.

Background and History

The original web page was designed and built by John Waters at Penn State around 1997. John served as Web Editor for approximately the first two years, after which the responsibility was passed to Jim Pendley at Imperial Valley College. Carl Shuster assumed the position of Web Editor following the HAPS Annual Conference in Phoenix, AZ, in 2002.
Jim credits the current popularity of the listserv to a lessening of what he describes as “flame wars” and “beating issues to death.” Also, the list serve is the most popular HAPS offering to new members, who see it as an opportunity to pick the brains of seasoned A&P educators.

Unfortunately, due to the fact that the listserv and the website are not joined, it has been difficult to put together an on-line archive and search of past postings to the listserv. A searchable archive of the listserv is, by far, the most requested feature for the website.

HAPS has outgrown both the current website and the listserv; this growth has started to create problems as the membership database expands. Because the website is completely run by volunteer effort, responses to members’ problems with such issues as logging-in and finding information have been slower than most people expect from a professional website. In addition, the website has been down more than once this year, mostly due to small miscommunications with the service provider (the company that actually has hapsweb.org on their server). As use of the website increased, these small problems grew in number and importance, and in 2004, the BOD voted to find a professional company to build and host the website. Affiniscape.org was chosen from a list of three finalist companies. A list of services that the new website will provide is included below.

**What Will the New www.hapsweb.org Offer?**

The main advantage of the new website is that we should have fewer problems with the membership database (which should lessen login problems), easier editing ability (therefore, the publishing of web pages will be within the grasp of regular, non-technical HAPS members), more on-line support for members having difficulty with the site, and, finally, the listserv and website will be united, allowing members to search archival listserv postings. Here are some additional features we will be gaining:

1. **Expanded on-line dues payments and Member Profile forms:** This will include multiple online payment options based on HAPS’ capabilities. We will have automatic e-mail renewal reminders. Registrations can be e-mailed to a HAPS contact or stored in a text file to be downloaded into MS Excel.

2. **Expanded on-line publications capabilities:** Members will easily be able to post publications to the HAPS site in a timely manner, utilizing PDF format. We will be able to use mass e-mail to notify members immediately after posting.

3. **An events calendar:** Members will be able to search the entire calendar by “Event Type” and e-mail a notice of the event to a friend. An important fact is that the “Easy Form Generator” is available to members to set up online registrations, which can be e-mailed to a contact or stored in a text file to be downloaded into MS Excel. Also, we will be able to set up automatic e-mail confirmation and daily e-mail the attendee list to the staff contact person.

4. **Future convention/workshop management:** Eventually, we will be able to register for all events and workshops without entering personal data and to create and print a personalized itinerary with workshops and other conference events. As we will still be operating on volunteer labor, this feature may take the longest to be implemented.

---

**Past, Present, and Future - continued from page 18**

John Waters’ first website was simple but extremely useful. It was used as a means to post information about HAPS for the general public, as well as some useful dates and documents for the membership. There were not many changes to the website under Jim Pendley’s management, other than switching from a complex URL address at Penn State to the simpler www.hapsweb.org (haps.org, haps.net, and haps.com were already owned by other organizations). The use of the website was limited, however, because many HAPS members still did not have much contact with the Internet. In fact, many members did not even have email addresses.

In 2002, the HAPS Board of Directors (BOD) saw a need to expand the website in order to accommodate the growing ability of the internet to exchange documents, tackle such services as renewing membership and conference registration, and take on an active role in membership recruitment. OSG, the then HAPS management company, saw possibilities for streamlining data entry, information retrieval, and updating members’ information. During the yearly BOD meeting at the HAPS Annual Conference in Phoenix (2002), there was general consensus (although by no means unanimous) that the website should take on a more active role. But there was little agreement on how to achieve that goal. Funding was a major concern, since websites can be very costly to build and maintain.

At the time, a friend and I had a small business putting together websites for small organizations, especially those involved with on-line education. Because of this background, I was asked by the BOD to put together a list of basic needs that HAPS would expect from its website. I presented this “wish list” to several companies, who submitted proposals. Prices seemed exorbitant, and the BOD sought alternative solutions.

One such solution appeared when Justin White of YTZ Technical Services in Plano, Texas (and husband of HAPS member Donna White,) offered to build the site free of charge. He worked many long hours, devising a member’s area, login area, and a searchable database from scratch, and for that service he deserves our heartfelt thanks. One interesting note: during this project, Justin put together an “open source” internet publishing tool for building websites with a member’s area log-in and a searchable directory that is free for all to use. For more information, go to: http://www.ytztech.com/demo/.

The listserv (HAPP-L) has an altogether different background. Started in 1998, HAPP-L came about when Jim Pendley decided that he would like to have input from kindred souls—people who taught Human A&P but who did not have many colleagues within their institution with whom they could share information. He gave techical Services in Plano, Texas (and husband of HAPS member Donna White,) offered to build the site free of charge. He worked many long hours, devising a member’s area, login area, and a searchable database from scratch, and for that service he deserves our heartfelt thanks. One interesting note: during this project, Justin put together an “open source” internet publishing tool for building websites with a member’s area log-in and a searchable directory that is free for all to use. For more information, go to: http://www.ytztech.com/demo/.

The listserv (HAPP-L) has an altogether different background. Started in 1998, HAPP-L came about when Jim Pendley decided that he would like to have input from kindred souls—people who taught Human A&P but who did not have many colleagues within their institution with whom they could share information. He gave
Past, Present, and Future - continued from page 19

set up, so patience is appreciated.

5. **On-line directories:** Searches can be secured, and HAPS will control how and what member data are displayed. Member addresses can be linked to a map to show those member’s geographical locations. An “advanced search” will allow searches by any database field and will allow member photos, biographies, etc. to be displayed. A Supplier/Vendor Directory, which can be linked to a geographical map of locations, will be included. The Web Editor will be able to add a “Specials” field that a supplier can update at any time.

6. **“Blast” e-mail:** Members will be able to send a text or HTML e-mail to any member group in the database, if given permission by the Web Editor. This will include the ability to “insert mail merge” fields into any blast e-mail such as Dear (Name). We will be able to send e-mails based on any field in the database such as board, committee, etc. This will be an important tool for contacting inactive members.

7. **Leadership area:** HAPS will be able to set up any board or committee list by just filling in the blanks.

8. **Complete site search:** Type in a word and search the entire site.

9. **Quick polls and surveys:** If given permission by the Web Editor, any member will easily be able to set up on any page of HAPS site, with “one vote-one member” capabilities. There will be an immediate display of results, if desired.

10. **Job bank/classified advertisements:** Institutions will be able to post and edit their own listings, if given permission by the Web Editor. Our staff can add, edit, and approve listings, and it will include a keyword search.

11. **HAPS storefront:** Remember those vertebrae mugs? We may be seeing those on-line someday, as well as T-shirts and other HAPS paraphernalia.

12. **Message boards:** We will be able to set up multiple discussion forums. This will be especially handy for members who are searching for roommates during conferences and for committees that would like to have an on-going conversation on-line.

---

**Anatomy and Physiology Instructors**

Two full-time positions available for Fall 2005.

Collin County Community College, located in North Texas, has three campuses with a rapidly increasing enrollment. In order to meet the increased demand for pre-requisite courses for allied-health programs, CCCCD seeks two additional anatomy and physiology instructors to begin in Fall 2005.

**Duties:** Teach one- and two-semester combined human anatomy and physiology courses.

**Qualifications:** Master’s degree required, Ph.D. preferred.

Application forms and information about the college and its programs can be found on the CCCCD website: www.ccccd.edu
HAPS COMMITTEES AND BOARDS

ANNUAL CONFERENCE
Henry Ruschin, Chair
Humber College
205 Humber College Boulevard
Toronto, Ontario, Canada M9W 5L7
(416) 675-9955 X4641
(416) 675-2015 fax
henry.ruschin@humber.ca
Development of a standardized fee structure for the annual conference, formulation of guidelines and assistance for the conference coordinator, and generation of a calendar of conference sites.

CURRICULUM AND INSTRUCTION
Carol Veil, Chair
Anne Arundel Community College
101 College Parkway
Arnold, MD 21012-1895
(410) 777-2265
(410) 777-2525 fax
cveil@aacc.edu
Developed a revised edition of the HAPS Human Anatomy and Physiology Course Guidelines. The second edition includes new guidelines relating specifically to the laboratory component of the course.

GRANTS AND SCHOLARSHIPS
Richard Faircloth, Chair
Anne Arundel Community College
101 College Parkway
Arnold, MD 21012-1895
(410) 777-2272 fax
RFaircloth@aacc.edu
Reviews all grant and scholarship proposals, selects proposals to receive funding, and submits its recommendations to the Board of Directors for approval.

MARKETING
Donna White, Marketing Manager
Collin County Community College
2800 E. Spring Creek Parkway
Plano, TX 75074
(972) 881-5889
(240) 255-1279 fax
dgwiget@ccccd.edu
Promotes HAPS and functions as the liaison between HAPS and A&P vendors.

MEMBERSHIP DEVELOPMENT
Bobby Baldridge, Chair
Asbury College
1 Macklem Dr.
Wilmore, KY 40390-1198
(859) 858-3511 x23
(859) 858-3921 fax
bobby.baldridge@asbury.edu
Recruits members and compiles membership information.

NOMINATING
Ric Martini, Chair
University of Hawaii
5071 Hana Highway
Haiku, HI 96708
(808) 572-2113
(808) 572-2114 fax
martini@maui.net
Responsible for recruiting nominees for the elected offices and appointed positions of the HAPS organization.

PARTNERS ASSOCIATION
Ric Martini, Chair
(see above information)
Coordinates the pursuit of common goals, information exchange, and the sharing of resources between HAPS and other professional societies.

AD HOC COMMITTEES

PRESENDENTS EMERITI ADVISORY BOARD
William Perrotti, President Emeritus Liason
Mohawk Valley Community College
1101 Sherman Drive
Utica, NY 13501
(330) 792-5519
(330) 792-5556 fax
wperrotti@mvcc.edu
An experienced advisory group including all Past Presidents of HAPS. It provides advice upon request and adds a sense of HAPS history to the deliberations of the Board of Directors.

HAPS-ED
Nancy Kincaid, Chair
Troy University Montgomery Campus
231 Montgomery Street
Montgomery, AL 36104
(334) 241-5474
(334) 241-8665 fax
nkincaid@troy.edu
Provide advisory and support services to the HAPS-EDucator editor such as soliciting and reviewing articles, and proofreading the final draft of the HAPS-EDucator before it goes to press.

HAPS WEB PAGE
Thomas Lehman, Chair
Morgan Community College
17800 Country Rd. 20
Fort Morgan, CO 80701
(970) 542-3211
tom.lehman@morgancc.edu

REGIONAL CONFERENCE
Javni Mody, Chair
Anne Arundel Community College
101 College Parkway
Arnold, MD 21012-1895
(410) 777-2265
(410) 777-2525 fax
jmody@aacc.edu
Mentoring assistance to coordinators of regional conferences. Anyone interested in hosting a regional conference should contact the Chair.

STEERING
Thomas Lehman, Chair
(see above information)
The Steering Committee consists of all Committee Chairs, coordinates activities between committees, and represents collective committee activity to the HAPS Board of Directors.

ANIMAL USE
Melaney Cook, Co-Chair
Salt Lake Community College
4900 S. Redwood Rd.
Salt Lake City, UT 84130
(801) 957-4793
melaney.cook@slcc.edu
The committee chairs invite input from HAPS members and willingly provide information on the activities of their committees.

CADASTER USE
Paul Krieger, Chair
Grand Rapids C.C.
143 Bostwick Ave. NE
Grand Rapids, MI 49503
(616) 234-4250
pkrieger@grc.edu
Developing guidelines for use of cadavers in anatomy and physiology instruction.

SAFETY
Karen McMahon, Chair
University of Tulsa
600 S. College Ave.
Tulsa, OK 74104
(918) 631-3129
(918) 631-2762 fax
karen-mcmahon@utulsa.edu
Developing standards for safety in the laboratory.

TESTING
Janis Thompson, Chair
Lorain County Community College
1005 North Abbe Road
Elyria, OH 44035
(440) 366-7245
(440) 366-4342 fax
jthomps@lorainccc.edu
Recently completed, tested, and approved the HAPS Standardized Test for Human Anatomy and Physiology. Any HAPS member may obtain a copy of the test by writing to the Chair.

CONFERENCE COORDINATORS:
2005 in St. Louis, Missouri
Margaret Week, Coordinator
St. Louis College of Pharmacy
4588 Parkview Pl.
St. Louis, MO 63110
(314) 446-8483
(314) 446-8460 fax
mweck@stlcop.edu

2006 in Austin, Texas
Mary Lou Percy, Coordinator
Navarro College
3200 W. 7th Ave.
Corsicana, TX 75110
(903) 875-7519 x381
marylou.percy@navarrocollege.edu
The committee chairs invite input from HAPS members and willingly provide information on the activities of their committees.
Complete Solutions for Life Science Education

Life Science Data Acquisition & Analysis Solutions

Simplify your labs & empower your students!

- New BSL 3.7 software
- New MP35 data acquisition unit
- New stimulator output & triggering options
- New video support & sample data files
- New curriculum materials

The Biopac Student Lab
60+ Lesson Experiments
Certified Human Safe (IEC60601-1)

Join thousands of satisfied teachers & students

NEW BSL Catalog!

See what you’ve been missing…
Visit our web site or request a NEW BSL CATALOG today!

www.biopac.com
Tel (805) 685-0066
Fax (805) 685-0067
42 Aero Camino, Goleta, CA 93117