Spring 2003

HAPS EDUCATOR

HUMAN ANATOMY & PHYSIOLOGY SOCIETY

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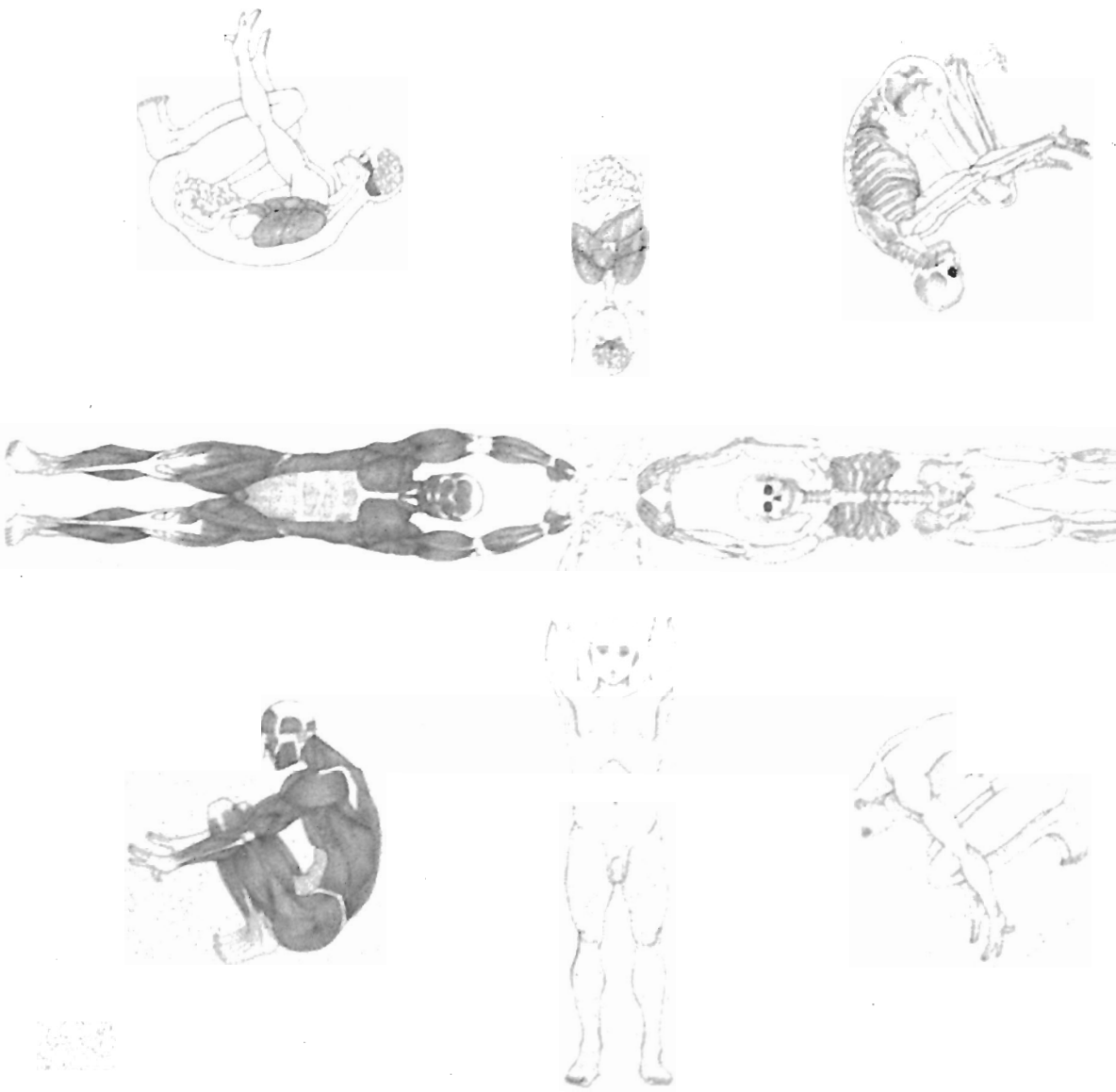

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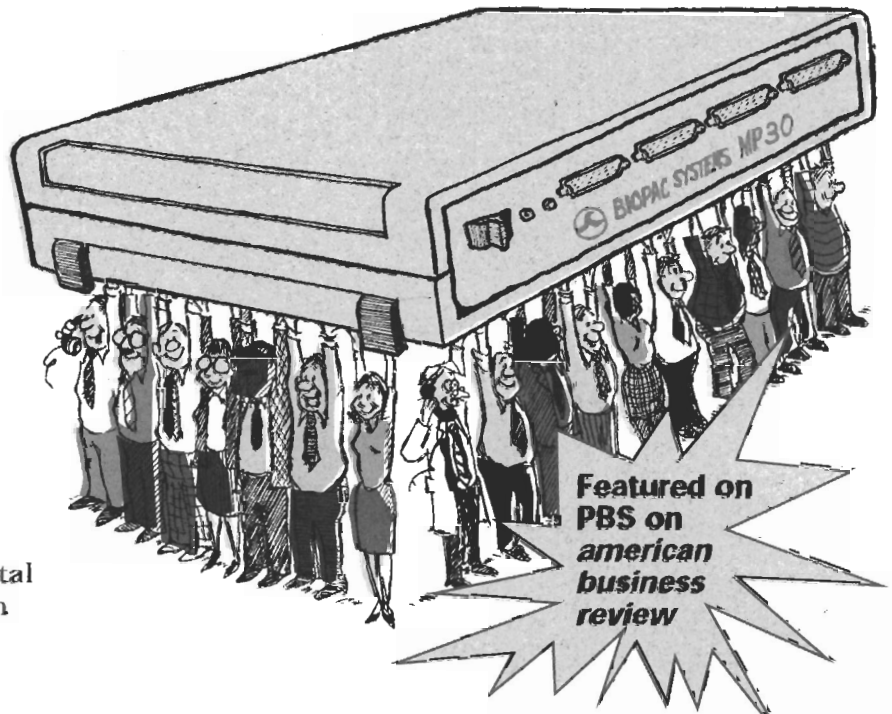

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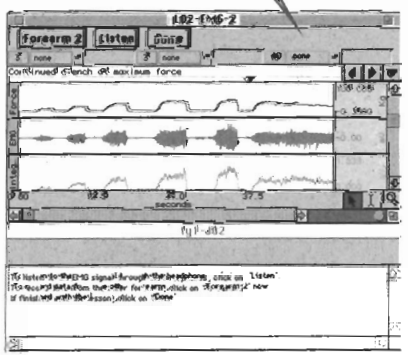

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Congratulations and thanks to the artist of the cover illustration, Marie Sena, who is originally from Santa Fe, New Mexico. She is currently a sophomore at Iowa State University, majoring in Biological Pre-Medical Illustration, and enjoying learning Anatomy and Physiology from HAPS member, Leslie Miller. Her educational plan is to go to graduate school at either the University of California Santa Cruz to study scientific illustration, or to Johns Hopkins University to get a medical illustration degree. Her professional plans include doing scientific and medical illustrations, and possibly working with facial prosthetics.

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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, 8000 Bonhomme, Suite 412, St. Louis, MO 63105. 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 welcome. Articles may be submitted to the editor by e-mail attachment as 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.

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

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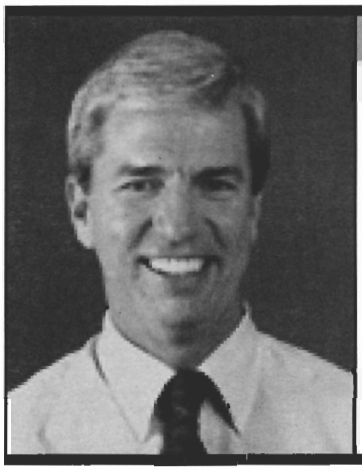


GREETINGS FROM YOUR PRESIDENT

Michael Glasgow, HAPS President

The HAPS Board of Directors has returned from the winter meeting in Ft. Myers. I think it is safe to say that we all feel generally quite good about the outcome of that opportunity for us to meet face-to-face and to address some of the fast-paced developments that characterize our Society at this time. Besides the routine business of operating an active and thriving Society such as ours, high points of the agenda were issues related to the upcoming Annual Conference in Philadelphia and the ongoing development of hapsweb.org.

As always, excitement is building toward our annual celebration of the completion of the spring semester and the opportunity to meet again with HAPSters we get to see but once a year. This year, Philadelphia beckons as the site for that meeting, and Lakshmi Atchison's announcements on the website and in the *HAPS-EDucator* continue to keep us abreast of the interesting and exciting attractions we can expect to enjoy during our visit to the City of Brotherly Love. I do hope you will plan to attend.

Even as I write, the capabilities for interaction with other HAPS colleagues and for participating in HAPS activities are growing rapidly. Many members obtained their initial information about the Philadelphia conference by downloading the Preconference Information from the website, and others even entered their proposals for workshops through the site. As one might normally expect, there were some glitches in the early going. These all were easily managed with some precautionary email backup. However, as the full capability of the site is brought into being by WebEditor, Carl Shuster, and consultant, Justin White of YTZ Tech, the firm contracted to develop and maintain hapsweb.org, our confidence is growing that the site will reach its full capability and will perform smoothly very soon!

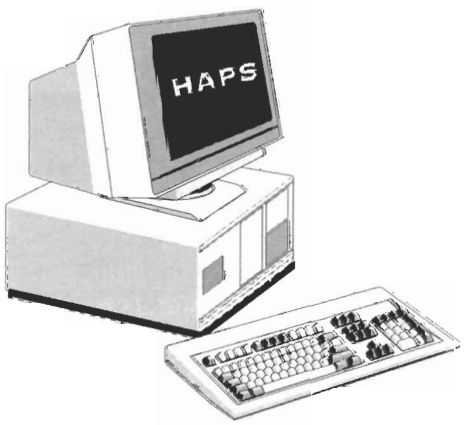
Among the more complex operations that Justin is building into the site are capabilities for renewing memberships online as well as registering for conferences (both Regional Conferences and the Annual Conference), all with the convenience and speed afforded by credit card transactions. Soon to be added to the online membership directory is a custom search feature that will greatly facilitate closer communication between members and their Regional Directors and Committee Chairs. Having recently taken legal steps to validate email communications as a means for the Board to operate during the months between official meetings, I am especially appreciative of the promise that the Internet offers as a mechanism for enhancing access to all membership benefits for every member of the Society.

Of course, there are numerous legal issues as well as technical ones that we have had to address as these features are placed into action; but be assured that the progress is steady and the results near. We seem so close now that we expect to have the option of online transactions by the summer of 2003 and easily in time for the Calgary Conference in 2004. Be sure to visit hapsweb.org frequently to stay in touch with what it has to offer you. The list is growing steadily.

I will close now by acknowledging that we were back at our home locations for only a very short time before we learned of the passing of our dear friend and colleague, Sandy Grabowski. As the memorial to Sandy printed in this issue of the publication to which she gave birth will attest, she has played a significant role in the history of HAPS. We will miss her greatly.

Have a healthy and peaceful spring,

Mike



In Memory Dr. Sandra Reynolds Grabowski

In January HAPS was saddened to learn of the death of one of its distinguished members, Sandy Grabowski. In the following, *HAPS-EDucator* has tried to excerpt some of the many tributes paid to her.

Dr. Sandra Reynolds Grabowski, 59, of 304 Overlook Drive, West Lafayette, IN, passed away Monday afternoon, January 20, from complications resulting from cancer of the appendix. Since 1977 she served as an Instructor in Purdue's Department of Biological Sciences. Her husband, Zbiginew, who survives, is a Purdue Professor Emeritus of Physics.

Born and raised in the Chicago area, Dr. Grabowski did her undergraduate work at Purdue University, graduating in 1965 with Honors in Biology. She subsequently received an award at Purdue for outstanding research by a graduate student in Biological Sciences. In 1973 she was awarded a doctoral degree in neurophysiology, followed by three years of postdoctoral work at Purdue, all in electrophysiology of visual systems.

Dr. Grabowski was co-author with Gerard Tortora of multiple editions of a major teaching text: *Principles of Anatomy and Physiology*, followed by multiple editions of a second text: *Introduction to the Human Body*. For 25 years Dr. Grabowski taught BIOL 301/302, Human Design: Anatomy and Physiology, for a wide range of academic programs within Purdue University. She eventually was voted one of the top 10 teachers by students in the School of Science. Nationally, she was a founding member and served as President of the Human Anatomy and Physiology Society from September 1990 to May 1992, having been an Executive Board Member and Editor of the *HAPS Newsletter*, forerunner of the *HAPS-EDucator*. Her work substantially changed the format and quality of information found therein, and laid the foundation for future editors.

"Sandy really, really loved to write and she thought she could touch more people with more knowledge by writing. Writing was not Grabowski's only passion. She was passionate about her students. Whenever there was an issue that involved her or her students, she would call into the (biology) office to see what she could do to help," said Rex Fodrea, director of biology counseling at Purdue. "She was teaching even though she was fighting cancer. She tried to finish out the fall semester, despite her illness. That's who she was. If you think about everything a university is about, it comes down to two things: people and integrity. Sandy was all about the people in her class, which literally thousands of pre-pharmacy students went through," said David Asai, head of the Purdue Department of Biology.

Sandy's cheerful smile, her thought provoking questions and her gregarious nature will be missed by her colleagues and fellow HAPS members. Sandy, thanks for being one of us and leaving us with such fond memories.

HAPS 2004
18th Annual Conference
Calgary, Alberta, Canada

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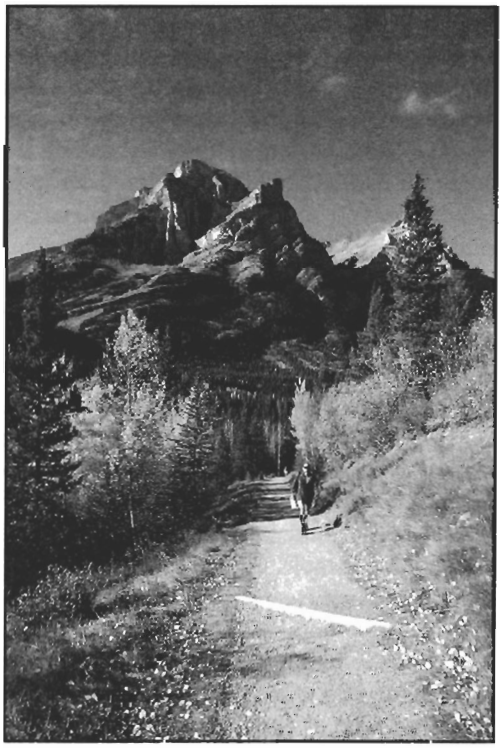
Picturesque Prairies, Majestic Mountains! Plan to experience both during the HAPS 18th Annual Conference in Calgary, Alberta, Canada from June 12th to 17th, 2004. Calgary, the site of the 1988 Winter Olympics, is set in rolling foothills between the grand Canadian Rockies to the west and the Great Plains to the east. Calgary will offer HAPSters the experience of two exciting worlds—vibrant, big-city life and outdoor adventure.

Calgary itself offers you the opportunity to explore the history of Canada's west and Calgary's early days at Heritage Park, the Glenbow Museum, or Fort Calgary. During your stay you can sample many different cuisines, ranging from the exotic offerings of the Far East to the latest food experiences including Canadian/ Rocky Mountain cuisine, served up in locations as varied as the top of the Calgary Tower to sidewalk cafes. Calgarians are known for their interest in outdoor pursuits and make good use of the 295 miles of cycling and walking pathways that wind their way along the Bow and Elbow Rivers and through the many parks. In the prairies, a short drive from Calgary, you can visit Alberta's Badlands and the world-famous Royal Tyrell Museum of Paleontology, which features some of the most stunning reconstructed dinosaur skeletons on Earth. Or you can learn about the buffalo hunting culture of the Plains Indians at Head-Smashed-In Buffalo Jump. Of course the Rocky Mountains themselves and Banff National Park, only a 1.5-hour drive from Calgary, are also a must-see.

Watch for these articles in the next 3 issues of HAPS-ED about the HAPS 2004 Conference in Calgary:
***HAPS-EDucator* Summer 2003 Edition**—Attractions in Calgary;
***HAPS-EDucator* Fall 2003** Edition—attractions Outside Calgary Including the Rockies and Badlands;
***HAPS-EDucator* Winter 2004 Edition**—Plans for HAPS 2004 and Tips for Visitors to Calgary.

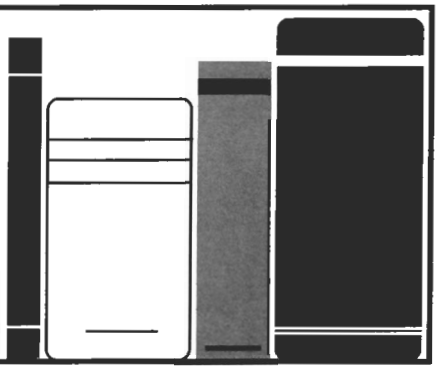
Photos were provided courtesy of Tourism Calgary, 1-800-661-1678.



Majestic mountains near Calgary

Calgary, Alberta, Canada, host city for HAPS 2004

EDUCATIONAL ISSUES



Another Planet, a Book Review

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Open Elinor Burkett's book and you see the Cast of Characters, as if waiting for the stage curtains to lift; the characters are students and staff of a suburban Minnesota high school at the start of fall semester, 1999. Burkett, a journalist, college professor, and author of several books on modern culture, spent the academic year with students and teachers attending classes and after-school activities, and talking with parents and administrators. She chose a school resembling, in size and affluence, Columbine High in Colorado, a site of student shootings the previous spring. Her goal: to soothe her journalistic obsession with the questions raised by such incidents. The result: a book less focused on teen violence than on an educational climate challenged by attitudes and choices of students and parents, fundamental and philosophical disagreement among teachers and administrators, old and new educational fads, and by a continuing ripple of effects of the "self-esteem movement" of the 1970's and 1980's, when the education of these students began. Is this school doing a good job educating its students? Burkett offered a surprising revelation—the students of this school score higher than average on national standardized tests, BUT they consistently fail to compete academically with their peers in other industrialized countries.

Burkett, whose high school education occurred during the 1960s, tells her story from a "fly on the wall" perspective, through dialog spoken by the characters, supported with her own observations and conclusions, related in a style that is interesting, humorous, and compelling. She describes both academic and personal lives of students of varying maturity and intellect. The prose was so frank that I was sure (and I was wrong) that pseudonyms had been used; she clearly had gained the trust and friendship of many. Rather than digest the book further, too colored by my own experiences as a university educator, I provide the following excerpts.

Memorable and surprisingly insightful **student** comments: "It was like they wanted to run a school but were afraid to teach us anything." "The problem is that the school is so focused on protecting the egos of students that it breeds mediocrity…If you never let anyone fail, how can they not be afraid of failure?" "Where's the line between self-esteem and self-delusion?" "You can get all A's without learning anything if you play the game." "There are teachers who are fun, and there are teachers who teach. I just never had one of the latter before Mr. Carr."

Teacher comments: "(my education professor counseled that a student) won't remember the right answer, but he will remember how he felt when you told him (he was wrong)" "…too many teachers…want to be students' friends. If we don't push students, how will they ever discover that if they really work, they can go much farther than they think? Isn't that our job?" "They get too many second chances and too little education." "These kids think that learning to cheat is an invaluable tool which will get them further in life than anything I can teach them." "…I will never receive…a phone call from a parent saying, 'Please explain why my kid is getting straight A's and can't do these things.'"

The book ends with an epilogue telling where the characters are now. One joined the Marines and revised his former philosophy (do only the minimum to get the grade you want, and aim low in tougher classes), and scored 100% on his final exam after basic training. He said, "In boot camp, they kick your butt if you don't try your hardest." One hopes that this student isn't the exception in what has been learned since high school graduation, and that teachers in high school and college can figure out an appropriate way to so motivate.

Throughout most chapters, one forgets that Burkett is there. In the final chapter, she delivers her impressions with a stern wallop. A sample of her comments: "…the New New Math (was) pretty much the Old New Math in multicultural drag." "…coddling…provided (students) with none of the academic benefit promised by proponents of self-esteem training…feeling good about themselves left kids to achieve less, not more…" "Does it make sense…to treat (students) as if they are too dim-witted to comprehend that some people are simply smarter than others? To expect them to reason and create without a base of knowledge on which to build?... It is knowledge they need." "…sugarcoating education had sent the message that learning was a bitter pill." "No one had ever suggested to me that education should be fun. As a consequence, I learned …discipline of mind and a wealth of

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knowledge...."

Another Planet should be on the bookshelves and in the minds of all teachers, parents, and past and present students. As you read it, you will laugh and reminisce upon your own high school experiences; you will note that many things have not changed because they are just human nature; you will discover characters of like mind among the teachers, students, administrators, and parents; and you may gain a little insight into the background and thought processes of your own college students.

Burkett, Elinor, 2002, *Another Planet,* HarperCollins, New York, 335 pages.

EDU-SNIPPETS

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EDU-Snippets is a column designed to let you—the HAPSters—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. However, we think everyone will be able to tell where our introductions and commentaries end and where our contributors' words begin.

pO_2 and Hemoglobin Saturation

Pat Bowne (Alverno College, pat.bowne@alverno.edu) tells us she likes this exercise because it gives her an excuse to throw things at her students!

So, here is how Pat demonstrates pO_2 and Hemoglobin Saturation: Students are seated at tables. Each table represents an RBC, each student a molecule of Hb. I throw hard candies out to represent O_2 molecules; those that hit the floor represent the O_2 dissolved in the plasma, but of those that hit the table each student can pick up a maximum of 4. Each student can then calculate his or her own % O_2 saturation. The students can also calculate the % saturation of the table, and then pool the data to find the % saturation of the entire room.

To demonstrate the Bohr shift, I throw a second kind of candy out to represent H^+. Students can pick this candy up as well, but they cannot have more than 4 pieces total, so they have to drop off some of their initial 'O_2' to the tissues. Each table can then recalculate its % saturation. The pooled class results can demonstrate the effect on the O_2 saturation. The curve's numerical values might not be totally representative of what is found in nature, but the concept is and the extrapolation is easy.

Sponges

Speaking of H^+, David Evans (Penn College/PSU, devans@pct.edu) suggested we use this comparison. Buffers are like H^+ sponges, "soaking up" where ions are in excess and "squeezing out" where more are needed.

That brings us to a suggestion from Susan Baxley (Troy State University Montgomery, sbaxley@tsum.edu).

Use a baby's sponge puzzle to demonstrate that a three dimensional enzyme must have a specific shape so that its substrate can exactly fit into it. The two-piece puzzle that I use has one piece with a hammer shaped hole cut into it; the other piece is a hammer. I tell my students that the enzyme is the puzzle piece with the hole; the substrate is the hammer. Obviously, the hammer exactly fits into the hole in the other piece. To demonstrate denaturing, I pull the piece with the hole out of shape, and then unsuccessfully try to fit the hammer into the hole. I have found this to be an inexpensive but effective demonstration.

Study Skills

Of course one thing we as educators are all concerned with is study skills. Three HAPSters contributed EDU-Snippets dealing with helping our students learn the material.

The Skeleton

Henriette Evans (Penn College of Technology/PSU, hevans@pct.edu) would like feedback from anyone who tries this—either with the skeleton or with some other body system.

This is a very simple technique that can be used successfully with all types of learners—visual, auditory and/or kinetic. It helps not only with learning the terminology, but also with anatomical spelling. This method can be applied to the learning of most of the body systems.

Let us illustrate the idea using the "frontal" bone. The student is asked to make black and white copies of each view of the skull and then to color only the frontal bone on each copy, using only one color for that bone. The student then cuts out the pictures of the skull, excluding all the labeling. Then, using an 8x5 white card (white for plain background), the student titles the card: "Frontal Bone", and on the same side of the card, lists only the needed markings/features for that bone. On the opposite side of the card, the student attaches/tapes (one on top of the other, and taped only on the top side), all the photocopies of the skull where the frontal bone is colored. The top copy should be

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Edu-Snippets - continued from page 7

the one that shows the best view of that bone. No writing is done on that side of the card. The end result is a little booklet for the "Frontal Bone."

The advantages of this procedure are: 1) The students are able to identify the specific bone from every view/angle. 2) They are able to associate that particular bone with its specific markings as listed on the card. 3) The students are taking an active part in the learning process. 4) This technique breaks the skeleton chapter into simple learning blocks that are easier to memorize and put together. 5) In addition to simplifying the studying, reviewing becomes more specific and therefore less overwhelming.

Non-Traditional Students

Meanwhile, Sandra Stewart (Vincennes University, sstewart@indian.vinu.edu) offers us a suggestion to help our non-traditional students.

We have a large number of non-traditional students who cannot get into lab to review the models and dissections or attend review sessions as much as they need or would like. To help them, I took digital pictures of all the models, tissues, experiments, and dissections used for each lab. I then labeled them using PowerPoint and saved them as JPEGS. I put them on Blackboard and made them available for all students.

The students use these pictures to prepare before coming to lab and to review before tests. I see the images printed out in their notebooks, and they refer to them while looking at the real thing. The GPA and retention rates have gone up since implementing this support. They even tell me what they want in regards to the images!

I have streamlined the process so it is not terribly difficult and we do get good results.

Memory vs. Understanding

And Jason Taylor (Red River College, jjtaylor@rrc.mb.ca) explains his method of dealing with the problems of memory vs. understanding in the learning of anatomy and physiology.

In chatting with individual students throughout the term, I realized that although they seemed to know facts, they were unable to use these facts to tell a story or relate these facts to a real-world situation. To help foster these skills, I implemented what I call the 5-Minute Paper. At the beginning of class, I give the students a question and they write an essay on it. I ask that the paper be constructed with an introduction, body, and conclusion. The question is based on material that we have recently covered and may require them to apply the facts from lecture to a case study. For example, the last paper required them to use their knowledge of touch and pain sensory pathways to explain why damage to a particular side of the spinal cord might cause ipsilateral deficits in touch and contralateral deficits in pain sensation.

I read each paper and make comments where appropriate. It takes me approximately 2 hours to read 100 papers (I read them while watching the news.). Initial feedback suggests that the students are not entirely happy with this new activity, but they are adapting. Their greatest complaint is that the questions are hard and they do not earn any marks for them. I look forward to their end of term feedback to see if their perceptions have changed.

One unexpected bonus of the activity is that the students settle down, so those first five hectic minutes of class are actually spent with everyone thinking about anatomy and physiology.

Also, I am seriously considering adding long answer questions to my exams next year and, through the 5-Minute Paper, I am creating a testbank that has already been beta-tested by a group of students!

Anatomical Systems

Two HAPSters submitted ideas on practical ways to present aspects of particular anatomical systems. These ideas are always welcome!

Skeletal Muscle

Gail Jenkins (Montgomery College, gwj@erols.com) gives us some practical ways to model certain facets of the Skeletal Muscle System.

To introduce skeletal muscle organization, use a thick rope that contains cords that are twisted together and an end that has been teased apart. Components of the rope are correlated to parts of a skeletal muscle. The rope itself represents a skeletal muscle, a rope cord represents a fascicle within the muscle, an individual strand represents a muscle fiber within the fascicle, and the rope fibers within the strand represent myofibrils. Now tie the rope to a table leg or other heavy object and move the table by pulling on the rope. Explain that trying to pull the table with an individual rope fiber would result in breakage of the fiber. But, we are able to pull the table with the entire rope without the rope breaking because many rope fibers are bundled together. The entire rope is stronger than the sum of its parts, just as bundling muscle fibers into fascicles helps a skeletal muscle have a stronger contraction.

(The classroom correlation to the above exercise is, of course that working with one's lab partners will result in greater collective learning than working alone.)

To explain the purpose of asynchronous motor unit contraction ask the students to stand in one row around the room, shoulder to shoulder and close but not touching. The demonstration works best if the student row curves so that students can view their classmates. Ask every third student to raise both arms then lower them in sequence, in other words, have one third of the students do a stadium wave. Point out how choppy the wave is. Ask all students to flex their arms in sequence. Point out that the wave is less choppy. Now ask students to try to make their very best wave. Starting with the student at the left of the line, each student in sequence flexes first his or her left arm then his or her right arm. Compliment them on their wave and add that 10,000 spectators at a baseball game could create a great wave. Now correlate the students' arm movements to the contraction of motor units. The more motor units that take turns twitching, the smoother the overall contraction.

Autonomic Nervous System

Cynthia Surmacz (Bloomsburg University, surmacz@bloomu.edu) sent an extremely interesting way to model that system so many of us have so much difficulty conveying to our students—the autonomic nervous system.

One topic I find especially challenging to teach is the autonomic nervous system (ANS), particularly its anatomical components. I have traditionally used the beautiful color illustrations found in

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various texts to show the detailed features of the parasympathetic and sympathetic divisions of the ANS. Even my best students would be overwhelmed by the complexity of the ANS and my weaker students clearly did not get it. This semester my students and I made a simple model of the ANS on the blackboard using tape, colored chalk, and colored ribbons. This was done with a class of 150 students in a large lecture hall. We developed the model in a stepwise manner identifying and labeling each component as we progressed.

To begin the ANS model, I initially drew and labeled a large spinal cord and brain on the blackboard. Preganglionic neurons of the sympathetic division were represented by green ribbons. One end of each green ribbon was taped to the central region of the spinal cord to indicate the location of the cell bodies of the preganglionic neurons of the sympathetic division. We labeled this section of the spinal cord as the thoracic and lumbar regions. Some of the green ribbons were short and their other ends were placed in a sympathetic trunk ganglion (vertebral chain ganglion).

The sympathetic trunk ganglia were represented by drawing circles with colored chalk around the ends of the short green ribbons. The sympathetic trunk was drawn in a vertical column parallel to the spinal cord and was so labeled. Some of the green ribbons were longer to show that some of the axons pass up or down to higher or lower ganglia of the sympathetic trunk prior to synapsing. Other long green ribbons traveled through the sympathetic trunk ganglia without synapsing and terminated in prevertebral (collateral) ganglia. The prevertebral ganglia were also circled with chalk and labeled. A final long green ribbon was shown extending to the medulla of the adrenal gland.

Postganglionic neurons of the sympathetic division were represented by red ribbons. We taped one end inside the synapse at each ganglion and then attached the other end to an effector. For effectors, we drew schematic diagrams of various organs on the blackboard (valentine hearts, etc.!)

The components of the parasympathetic division were then added to the same model. Preganglionic neurons of the parasympathetic division were represented by gold ribbons. To show the two locations of the cell bodies of the preganglionic neurons of the parasympathetic division, the gold ribbons were attached to either the brainstem to represent the cranial origin or to the sacral portion of the cord. These gold ribbons were longer than the green ribbons used previously to represent the preganglionic neurons of the sympathetic division. The gold ribbons did not enter the sympathetic trunk, but were taped at the end in the terminal (intramural) ganglia. The terminal ganglia were circled and labeled. Short postganglionic neurons of the parasympathetic division were added with blue ribbons. The blue ribbons were attached to the same effectors on the blackboard. Once this basic framework was established, we added the names of the specific neurotransmitters and defined cholinergic and adrenergic neurons. We next added the various types of receptors to the model indicating their locations.

Using the model, students worked in pairs to summarize their understanding of the parasympathetic and sympathetic divisions of the ANS by completing a comparison chart. On this chart, students were asked to distinguish the following features: location of cell bodies of preganglionic neurons, length of preganglionic fibers, types of ganglia, location of cell bodies of postganglionic neurons, length of postganglionic fibers, location of cholinergic and adrenergic neurons, types of effectors, and specific receptors. Students were generally successful in making these comparisons.

In the course of this exploration, we had also established a foundation to introduce the concept of dual innervation (and some exceptions) and to compare the divergence of the sympathetic and parasympathetic divisions. We then discussed the function of both divisions and autonomic control. The questions posed by the students after this activity were more thoughtful and in depth than those that I received using my previous approach.

Certainly there are pitfalls and limitations to any model and care must be taken when attempting to simplify a complex system. In this case, a concrete model of the ANS did help to clarify the key features of this complex system and to serve as a springboard for a discussion of more advanced topics.

Tests

And what would life be without a few tests? So, we have two contributions from the HAPSters.

Positive Feedback

David Evans (Penn College/PSU, devans@pct.edu) submitted this unique idea for enhancing several aspects of student learning via the test. If you try this, let David know as he is interested in some group feedback on how it works.

Among the several really important points to keep in mind when testing students is that the test should be returned in a timely manner. I always return tests at the next class meeting and in the process do several things which I believe enhance the learning experience.

Naturally, I go over the correct answers to the test but I do so in a way that involves all class members. In addition, I use one copy of the test to write the name of one correct responder after each question. I make certain every student has a chance to answer at least one question. I have never given a test where a student got absolutely no question right!

The advantages are: 1) It takes the emphasis away from me as a giver of truth, 2) it rewards students for being correct even if their over-all grade was weak, 3) it provides model answers, and 4) it helps to recognize and reinforce superior efforts.

Since I encourage cooperative learners and study groups, this latter advantage helps everyone to identify the best students. The others then know whom to approach to include in their study groups. Another advantage of the method is that it helps me to analyze student patterns in responses—i.e., what questions are difficult, and who was most likely to provide accurate answers.

A major disadvantage to the procedure is time. For a 50-question test, I need at least an extra 30 minutes to prepare my student model. In addition, the tests must be hand graded. Anyone using this model will need to sacrifice an additional 10-15 minutes (always at the end of class!) to go over the test. There is no legal basis for complaint from the students for following this technique since I do not announce bad grades publicly; I only display good work. Rewarding good academic work in public has been challenged in the courts and found to be legally acceptable.

Old Standby

And if worse comes to terrible, you can always just use this oldie-but-goodie sent to us by Dennis Kingery (Metropolitan Community College, dkingery@metropo.mccneb.edu).

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Here is a little item (old chestnut, really) that I've used in all classes, not only A & P. I am convinced that student success on exams and other projects lies in first reading the instructions and then following them. I do not suppose I am the first or the only one to notice that this does not always happen!

Early in the term I give a sample exam that provides multiple kinds of questions (simple items with easy answers, not biology content-related) to get the student accustomed to the variety of formats that they will encounter during the course. The sample exam instructions include the sentence "Read all the questions before beginning this practice test." The last item on the page is the instruction: "Immediately after reading this, draw a happy face, put your pencil down, and smile."

Most students will charge into the task, dutifully writing their best answers in laborious fashion. About 10 percent will have read the instructions, followed them, and smile early. I cannot say that this lesson works for every student, but it seems to help some to be more observant of instructions when the real exam comes.

We thank you all for your EDU-Snippet contributions. Keep those cards and letters coming! The next deadline is April 15, 2003. Submit your ideas now and maybe you too will see your EDU-Snippet in print!

HAPS 2002 *In Review*
Phoenix, AZ

Summary of Workshop # 302
They Gotta Wanna: Motivation Theory to Overcome Student Resistance to Active Learning

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An instructor engages in active learning anytime a teaching method other than lecture is used such as: pair and share, patient problems or case studies, small group work, debates, role playing, games, and formative quizzes. The instructor must anticipate student resistance to active learning and have a plan for gently encouraging them to participate.

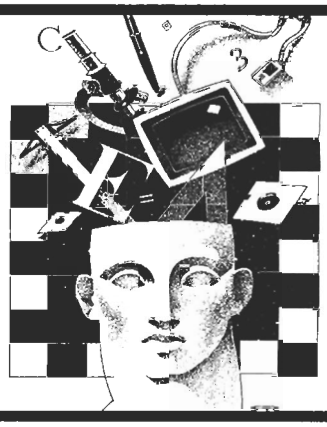
The presenter, Patti Thorn, wished to answer the following two questions: "How do students experience active learning?" and "What are the implications for instructors?" She observed Dee Silverthorn's Physiology Lab course, which uses active learning strategies exclusively, and then became a student in the class. Patti surveyed students and found that they report diverse experiences as they encounter active learning.

She found that only about 5% of students were successful from the beginning of the class, while some were never successful. However, she wondered about a group of students who were uncertain and frustrated at first but were able to become successful later. These students reported changing their perception and becoming hopeful. Motivation was the main reason for their ability to move from frustration to success.

Motivation involves three main components: value of task, expectancy, and goals. The instructor should address these factors that drive motivation to help students succeed with active learning methods. Students need the instructor to identify the immediate and long range functionality of a project, and to make them expect that they will succeed. Suggestions for helping students expect success include providing clear prerequisites, giving help or advice for remediation skills, assigning the appropriate level of challenge starting with an easy level, giving students many choices to learn a particular topic, and telling students that you believe they can be successful. It is beneficial to advocate a theory of intelligence that increases students beliefs that they will be successful, such as, "I can't be best, but can always be better at it."

In establishing goals, the instructor should try to focus on mastery, so that students will also. Patti advises making the classroom a safe place to take risks and downplaying competition.

TEACHING Tips



Designing Online Instruction to Maximize Student Success

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When designing a distance education program, many factors such as content, format, textbook, and audience, must be taken into account if the final product is to meet the course objectives. These are complex factors made even more complex by the variety of delivery systems available. What may not have been possible, or what may have even been a logistical nightmare in the traditional classroom, could be quite possible, or even preferable, in the online environment. This is especially important since not all learners have the same needs and also because the technology of today makes the individualization of instruction even more possible than it was in the past.

Choosing multiple delivery strategies is important, since the advantages of one resource may help overcome the limits of another resource. Media clips, explanations of information using illustrations or graphs with voice descriptions, can be quite useful in helping students understand the concepts being communicated, and can provide a powerful means of bringing life to instruction for the students in online courses. Media clip demonstrations not only personalize instruction, but also are quite helpful in clarifying difficult and confusing concepts.

The textbook is also a useful reference and a good general course guide. Most textbooks, with their logical and well-covered topics, can be readily coupled with Internet sites to provide diverse ideas for student activities. PowerPoint clips can summarize both unit objectives and chapter content. "Pen computing," using an electronic pen with an LCD screen pad, can be helpful in connecting students both with the instructors and with one another. Video-based technology allows for in-depth presentations. Each of these instructional strategies has its strong and weak points. Collectively, they complement each other, allowing for better delivery of distance learning and distance education. Using a combination of technologies is valuable in maximizing both the limits of individual technologies and the variations in individual learning styles.

The best content and delivery methods should include a consideration of the known information, the needs of the given society, and the needs and interests of learners – including their respective developmental stages.

Educators need to use their judgment and weigh the relative importance of not only content but also all other factors. These factors must be evaluated in relation to the aims, goals, and objectives of the distance education program. In this way, the educational system will serve both the students and the community at large.

Educational institutions must continually deal with evolving technologies. This means that faculty retraining in methods of course delivery must also continually evolve. As better practices and improved techniques surface, faculty will need to be informed and educated in these areas. These challenges come down to the decisions and policies that distance education programs need to adopt. With support, design, and implementation, educational institutions can achieve workable distance education programs.

The Big Picture of Cellular Respiration

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As an undergraduate biology major in 1980, I was required to learn the entirety of cellular respiration (glycolysis, Krebs cycle and the electron transport chain), every last detail. In preparation for the exam, I quickly got lost in the forest of biochemical reactions, memorized my head off and failed to see the big picture.

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Not suprisingly, I disliked the whole experience and did not understand cellular respiration until years later.

When I began teaching Anatomy and Physiology I and II about five years ago, I quickly realized that my presentation of the aforementioned material was ineffective. I was leading my students down a detail-ridden path that led to studying misery and, more importantly, gave them no clue as to the big picture of how cells provide energy for themselves. Let us face it, cellular respiration does not need any help being complex and intimidating. I wanted to find a way to give students something they could fall back on while studying for the exam, and perhaps remember even years later. The result follows here, the latest installment of an evolving attempt to provide my students with an overview concerning cells and their energy.

I use a few visual aids: a long stick, marshmallows, matches, a burning candle, a box of snappers from July 4 (the little bags that pop like a tiny firecracker when thrown on the ground), and a ball and stick glucose model. In addition, I put the summary reaction of cellular respiration on the chalkboard:

$$\text{Glucose } (C_6H_{12}O_6) + 6O_2 \rightarrow 6CO_2 + 6H_2O + 36ATP + \text{heat}$$

To begin, show students the overheads of glycolysis and the Krebs cycle and tell them that is where you are headed. They will grimace just as we all probably did. Next, hold up a marshmallow. This is food. What kind of food is it? Show them the back of the package; zero grams fat, zero grams protein, 100% carbohydrate. Pure sugar. They will all agree that we can eat a marshmallow and get energy from it. But how? In the digestive tract lumen, the marshmallow is digested to its monomers (monosaccharides; e.g., glucose) which are absorbed into the blood. These molecules are then transported to all cells of the body. But so what? Can a cell get energy out of this molecule? Is there energy in this molecule? Blank faces. What is he talking about? Hold up two balls and a stick. Does it require energy to put these two balls together? Everyone agrees, yes. Hold up the glucose molecule. By the same token, does it require energy to put these elements together to form glucose? Everyone agrees, yes, that sounds reasonable. Now, it may not be intuitively obvious to you (it is not to me), but on a molecular level, energy is released when the molecule of glucose is split apart. More blank faces. You are going to have to prove it to them.

With a marshmallow on a stick, light it. Remember, it is made entirely of glucose. Can we get energy out of the glucose? Ohhh, the light goes on. Sure. We could warm our hands or heat water with burning marshmallows. There is energy in a glucose molecule and you can release it. Explain that when burning, the glucose molecules in the marshmallow are being taken apart really fast, thereby releasing energy really fast. What if we break up all the molecules, all at the same time? Take a snapper and toss it on the floor. Little explosion. Do it again. Besides waking everyone up, what is happening? There are molecules inside the snapper that when triggered, break apart all at the same time, thereby releasing their energy all at the same time, resulting in a little explosion.

Now, go back to the original story. Molecules of glucose (or other nutrients) are delivered to our cells' doorsteps. Each of our cells is able to take these molecules apart relatively slowly, thereby releasing their energy slowly. That is all that glycolysis and the Krebs cycle are: the deliberate, step by step destruction of a glucose (or other nutrient) molecule.

As it happens, cells disassemble a glucose molecule by pulling off pairs of hydrogen (H) atoms in glycolysis and the Krebs cycle. Now, pull two H atoms from the model and toss them to a student. Show the resulting molecule. It is a little smaller; it contains a little less energy. Where did the energy go? It went with the H atoms that were transferred into the electron transport chain. That energy will ultimately be used to produce the bulk of ATP. Remember, in the gastrointestinal tract we break down food to molecules (not elements), absorb them into the bloodstream, then transport them to each and every cell. If we absorbed elements, cells would use more energy to assemble a molecule than it would gain in usable energy in that molecule's disassembly (because of energy lost as heat). Instead, you, your goldfish, your dog, even your little brother absorb molecules that were part of some other living organism (potato, pig, etc.). When we consume those molecules, our cells benefit from energy in molecules that some other living organism made. Or if you are dieting, your cells derive energy from molecules that your body had stored for just such a purpose.

Finally, tie up a few loose ends. Just as burning a candle or a marshmallow (or lipid or protein) outside the body requires oxygen, so does the process of cellular respiration. The products (carbon dioxide, water and heat) of the reactions are similar as well.

In summary, regardless of the extent of detail that you pursue in the phases of cellular respiration, remind your students that they can always fall back on the simple idea of breaking up molecule for its energy. They remember the marshmallows. The remember the snappers. Whether they like it or not, they have a least a tacit understanding of the big picture of cellular respiration

Long-term Projects for Morphology Courses

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In a previous article, I described some short activities that can be used to provide diverse experiences for both student and instructor in morphology labs. My goals in developing these alternative lab activities were to improve the quality of time that students spent in lab, to accommodate different learning styles provide students with an opportunity for self-assessment encourage learning through communication and interaction v

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others, to help students develop effective study strategies, and to encourage students to take ownership of the course material. Some years after I began to address these objectives with the short in-lab activities, our department challenged instructors to include long-term assignments in all their courses. To this end, I developed the long-term projects described below. These projects, which I use in lieu of the traditional term paper, address many of the same objectives as the short-term lab activities described previously. However, because of the extended nature of the projects, they can also be used to achieve some additional goals, such as:

- To provide opportunities for "writing across the curriculum", especially in writing genres other than the traditional laboratory report.
- To provide students with an opportunity to integrate other interests (courses, hobbies) with learning biology.
- To give practice in real-life application of biology, especially biomedical applications.
- To encourage in-depth involvement with a specific topic.

These long-term projects and my experience in using them were previously described in a workshop for the 2002 HAPS meeting.

THE PROJECTS

1. Children's story The goal of this project is to present a biological topic in such a way that it both conveys substantial, in-depth knowledge of the topic *and also* provides an attractive, entertaining story that will hold a child's interest. Students who enjoy creative writing and working with children often pick this project and, with some guidance, have produced lovely and imaginative illustrated stories. An excerpt from one student's story appears in Fig. 1. This story conveys the events of a leukemia attack from the point of view of a developing lymphocyte. The author creatively used both text and illustrations to convey her knowledge of blood cell biology. This project provides an opportunity for practice in communicating science in an unusual genre.

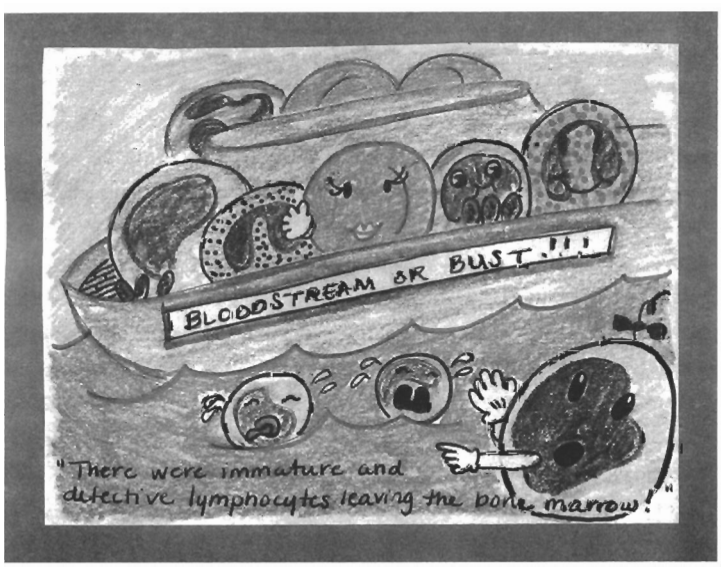

Fig .I Excerpt from a children's story.

2. Write and produce a play This project provides another opportunity for creative communication, with key biological information being conveyed by script, set, and costumes. I would normally envision this project being assigned to a group of students. However, one histology student who also was active in college theater eagerly volunteered to write and produce a play on macrophage activity. He enlisted several theater buddies to help make simple costumes, a set, and sound track, and then to perform and videotape the production to show in class.

3. Songbook In this project, the student selects some hard-to-memorize information from the course, and then sets it to music. I had envisioned this project as providing practice in developing unusual study strategies, not unlike the practice of inventing mnemonic devices. One student who chose this project wrote a song about digestive processes that begins:

"To everything, churn, churn, churn
There is a bolus churn, churn, churn
And for every bolus, there's digestion."

I keep hoping that some day a student will set the 12 cranial nerves or names of the bone marrow cells to music!

4. Photography project For this project, the student is challenged to find and photograph several *everyday objects* that have a structural resemblance to *anatomical or histological* objects that they have studied in class. They then pair the everyday photographs with pictures of the similar biological item and write a short paragraph explaining the specific structural features that the two items have in common. An example would be to compare a bare tree with its branching limbs and a multipolar neuron with its branching dendrites. This project encourages students to develop awareness of structure and of the observational processes that they use to study structure. In addition, it provides an opportunity for students who enjoy photography to apply their hobby to a biology course. Fig. 2 provides an example of a page from one student's photography project.

Fig. 2 Comparison of trachea and vaccum cleaner hose.

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5. Writing-intensive projects with clinical applications This is the type of project that I use most often in Human Anatomy and Physiology, because most of the students plan to enter the health professions and are eager to practice relating their knowledge to real life clinical situations. In one such project, students produce an informational *patient booklet* for patients who have been newly diagnosed with some disease/disorder. Ideally, the booklet will be attractively illustrated and will explain (in layperson's language) the basic biology of the disorder, the anatomical or cellular structures affected, methods of diagnosis, and a course of treatment. Another example of this type of project requires the student to create a *case study* of an imaginary patient who has a disease relevant to material studied in the course. Students are encouraged to use sophisticated presentation tools for these projects and to include patient charts, symptoms, diagnosis, treatments, and probable outcomes. A final example of a clinically oriented project is to develop a *public health campaign packet*. One recent A&P student completed an excellent packet of materials to be used for a public health campaign on the importance of folic acid. Her project included an attractive poster designed to convey general information, a patient-oriented pamphlet, and an information update notebook for dieticians, complete with pre- and post-testing questions.

USING THE PROJECTS

Assigning the projects

When assigning long-term projects, I prefer to allow students to work on a project of their choosing, although I often guide them in their selection. My experience is that the initial presentation of the assignment is one of the most crucial steps in introducing this type of activity into a course. For most of my students, these projects represent a new type of assignment, and they often express anxiety until I clearly explain my expectations, in terms of scope, content, and style of the project. I provide this information in a detailed *written* description of the project, as well as a sheet of grading criteria. An example of a project description appears below:

Assignment: children's story The goal of this project is to present a physiological process that we have discussed this semester. Your task (a bit of a challenge) involves two goals: (1) to convey substantial, in-depth anatomy and physiology; and (2) to create an attractive, entertaining story that will hold a child's interest. Illustrations and creative naming of characters are an excellent way to convey information about structure (anatomy and histology). I recommend that you design your story to involve a plot with characters. What does NOT work is to simply have a character recite a watered-down lecture about A&P.

In addition, it may be worthwhile to spend some class time discussing the pros and cons of different types of projects. While any student can probably succeed at any type of project, some students will be better suited to some than others. To ensure that each student has a clear understanding of his or her project, I require that they each submit a brief proposal and have a short consultation with me, to discuss expectations and strategies for dealing with the assignment. In addition, about midway into their completion of the project, students are asked to submit a progre report.

Timing and Time frame

I typically hand out a list of projects and have students mai their selection early in the semester. Students are given from fo weeks to an entire semester to complete the project, and oft present their completed work during the last class or lab.

Grading the projects

When I assign a long-term project as part of a course, I usual weigh the project grade rather heavily (up to 20% of final grade to encourage students to take the assignment seriously. Becau of the diversity of project types, I found it important to develop clear and consistent method for grading the projects. Studen appreciate being provided with a grading criteria sheet that shov the different aspects on which their project will be evaluated. F example, it is important for them to realize that both content ar execution (quality) count. Providing a grading criteria sheet w also prevent complaints of "I didn't know what you wanted" aft students receive their grades. To emphasize the importance of ear steps in the project, I always include some points for time submission of progress reports and/or consultations. An examp of a generic grade sheet, suitable for any project, appears in t appendix of this article

Benefits

To summarize, the projects described in this article prov easy, inexpensive, and enjoyable ways of introducing dive learning activities into traditional morphology courses. In experience, students enjoy the unusual nature of the projects, a will often invest considerable time, effort, and creativity in assignment. In addition, the projects provide practice communication skills, accommodate different learning styles, encourage students to develop a sense of ownership for the mate One further benefit is that most of these long-term projects are easily plagiarized. Finally, assigning these projects can be rewarding for the instructor because they seem to bring ou creative side of students and often reveal abilities that are obvious from standard assignments and evaluations.

The author wishes to thank students Melissa Carmen, Je Bellinger, and Jessica Fuore for the examples included ir article.

Appendix: GRADE SHEET FOR FINAL PROJECT

1. **Timely submission of progress report**..... ___ (5 pts
2. **Content**
   a) correctness/accuracy..... ___ (10 pts
   b) depth/detail of coverage..... ___ (10 pts
   c) appropriate content (fits assignment)... ___ (5 pts
3. **Execution**
   a) neatness/creativity/organization/artistic (different criteria for each topic)... ___ (10 pt
   b) overall effectiveness; success in accomplishment (goal set up during consultation)..... ___ (10 pt

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Mary Bracken
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PO Box 668
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(972)-563-1667 fax
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- Written statement of administrative support/approval from the host institution agreeing to co-sponsor the HAPS Regional Conference and to allow use of its facilities
- Request for seed money, if needed (see HAPS support in Guide)
- List of 3-digit zip codes (first 3 digits) for areas to be included in mailings (usually not more than a 250-mile radius)

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HAPS COMMITTEE REPORTS

Regional Conference Committee

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Several regional conferences are in the planning stages for next year. Some have not declared specific dates yet, but watch the HAPS web site (www.hapsweb.org) or contact the Regional Conference Committee for information. Terry Lee in **Kansas** has mentioned a date of Fall 2003. Geri Wright in **Virginia** might consider hosting a conference in Fall 2003 or Spring 2004. Laney Mobley in Kilgore, **Texas** is considering a conference for January or February of 2004. Judith Osborn at the University of **Maryland** has planned a conference for October 11, 2003. Matt Craig is contemplating Oct. 2003 in Amarillo, **Texas.**

As you can see, we are trying to reach out to the members. People would like to see more conferences in their local area. Some cannot attend the national conventions and would like to get updates in their teaching fields. What better way than to have a regional conference in your area?

Will you help by considering hosting a regional conference? Your first step is to contact your administration to get their approval. Then set a date and select your committee. Complete the proposal form on page 15 and mail to me. Do not wait. We need regional conferences for Fall 2003 and Spring 2004.

Regional Conference Planned in Maryland

The College of Southern Maryland in La Plata is hosting a HAPS Regional Conference on Saturday, October 11, 2003 from 8:30 am to 4:30 pm. The theme is expected to be "The Human-Computer Interface: Innovations in the use of Computers in Teaching Anatomy and Physiology." Persons interested in presenting a workshop on teaching techniques, especially involving computers, or other topics related to anatomy and physiology are invited to submit their names and pertinent information to Judith Osborn at judith.osborn@csmd.edu.

HAPS COMMITTEES AND BOARDS

The following committee chairs invite input from HAPS members and willingly provide information on the activities of their committees.

ANNUAL CONFERENCE COMMITTEE

Henry Ruschin, Chair
School of Health Sciences
Humber College
205 Humber College Boulevard
Toronto, Ontario M9W 5L7
(416) 675-9955 X4641
(416) 675-2015 fax
ruschin@humber.ca
The primary responsibilities of this committee are 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.

CORE CURRICULUM AND ASSESSMENT COMMITTEE

Murray Jensen, Co-Chair
General College
University of Minnesota
128 Pleasant Street SE
Minneapolis, MN 55455
(612) 625-0093
(612) 626-7848 fax
jense005@maroon.ts.umn.edu

Charles Wert, Co-Chair
4647 Shortridge St. S.E.
Albany, OR 97321-6402
(541) 924-9374
crwert@proaxix.com
This committee has developed a second, 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 COMMITTEE

Richard Faircloth, Chair
Department of Biology
Anne Arundel Community College
101 College Parkway
Arnold, MD 21012-1895
(410) 777-2272
(410) 548-0306 fax
RFaircloth@aacc.edu
This committee is responsible for reviewing all grant and scholarship proposals, selecting proposals to receive funding, and submitting its recommendations to the Board of Directors for approval.

MEMBERSHIP DEVELOPMENT COMMITTEE

Donna White, Chair
Math and Natural Science
Collin County Community College
2800 E. Spring Creek Parkway
Plano, TX 75074
(972) 881-5889
(240) 255-1279 fax
dgwhite@ccccd.edu
Committee members assist the Chair with recruiting members and compiling membership information.

NOMINATING COMMITTEE

Philip Tate, Chair
Department of Biology
Phoenix College
1202 W. Thomas Road
Phoenix, AZ 85013
(602) 285-7105
(601) 285-7528 fax
phil.tate@pcmail.maricopa.edu
The committee chair is always the current President-Elect. The committee is responsible for recruiting nominees for the elected offices and appointed positions of the HAPS organization.

PRESIDENTS EMERITI ADVISORY BOARD

William Perrotti (Past-President), Liason
Life Science Department
Mohawk Valley Community College
1101 Sherman Drive
Utica, NY 13501
(330) 792-5519
(330) 792-5556 fax

This is an experienced advisory group that includes all who have served as Past President of HAPS. It provides advice as requested by, and adds a sense of HAPS history to the deliberations of the Board of Directors.

PUBLICATIONS BOARD

Colin Wheatley, Chair
Nutrition & Physiology
McGraw-Hill Publishing
1222 Saalusa Road
Madison, WI 53711
(608) 277-7319
(608) 277-7351
colin_wheatley@mcgraw-hill.com

HAPS-EDUCATOR ADVISORY PANEL

(subcommittee)
Susan Baxley, Chair
College of Arts and Sciences
Troy State University Montgomery
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Montgomery, AL 36104
(334) 241-5473
(334) 241-8665 fax
sbaxley@tsum.edu

Members of the *HAPS-EDucator* Advisory Panel 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.

EDITORS:
HAPS-EDucator

Susan Baxley (See above information)

HAPS Web Page

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Carl Shuster
Biology Deprartment
Madison Area Technical College
3550 Anderson St.
Madison, WI 53704
(608) 246-6203
(608) 246-6880 fax
Cshuster@matcmadison.edu

REGIONAL CONFERENCE COMMITTEE

Mary Bracken, Chair
Biology Department
Trinity Valley Community College
1200 East Interstate 20
Terrell, TX 75160
(972) 563-9573
(972) 563-1667 fax
bracken@tvcc.edu
The committee provides mentoring assistance to coordinators of regional conferences. Anyone interested in hosting a regional conference should contact the Chair.

AD HOC COMMITTEES
ANIMAL USE COMMITTEE

John Waters, Chair
Biology Department
Penn State
413 Mueller Laboratory
University Park, PA 16802
(814) 863-1154
(814) 865-9131 fax
jrw8@psu.edu
A three-year plan includes widely distributing the HAPS policy statement, developing animal use internet links on the HAPS Home Page, monitoring relevant legislation, and creating a resource packet for HAPS members. Suggestions and questions from members are welcome.

CADAVER USE COMMITTEE

Christine Iltis, Chair
Department of Biology/Natural Science & Communication
Salt Lake Community College
Salt Lake City, UT 84130-0808
(801) 957-4640
(801) 957-4821 fax
Christine.iltis@slcc.edu
The goal of this committee is to develop guidelines for use of cadavers in anatomy and physiology instruction.

SAFETY COMMITTEE

Karen McMahon, Chair
Biological Science
University of Tulsa
600 S. College Ave.
Tulsa, OK 74104
(918) 631-3129
(918) 631-2762 fax
karen-mcmahon@utulsa.edu
The Safety Committee is developing standards for safety in the laboratory.

TECHNOLOGY COMMITTEE

Dayton Ford, Chair
Biology/Pharmaceutical Sciences
St. Louis College of Pharmacy
4588 Parkview Place
St. Louis, MO 63110
(314) 367-8700 X307
The committee monitors and reports on technological changes influencing anatomy and physiology teaching, such as advances in instructional software and data acquisition equipment.

TESTING COMMITTEE

Janis Thompson, Chair
Math and Science
Lorain County Community College
1005 North Abbe Road
Elyria, OH 44035
(440) 366-7245
(440) 366-4342 fax
jthompso@lorainccc.edu
This committee 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
2003 in Philadelphia, PA

Lakshmi Atchison
Department of Biology & Molecular Biology & Environmental Sciences
Chestnut Hill College
9601 Germantown Avenue
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