Promoting Excellence in the Teaching of Human Anatomy & Physiology
Greetings From Your President

Henry Ruschin

HAPS 2002—Phoenix, Arizona

Phil Tate, Ph. D.

Educational Issues

Stories From the Field; Problem-Based Learning from a Teacher’s Perspective

Sheilla Mierson

Knowing our “Molecular Selves” A Necessity for Good Teaching of Human Physiology?

David L. Parker, Ph. D.

Making Anatomy and Physiology More Humane—Part 2

E. S. Chapman

Teaching Tips

Developmental Biology Using Danio rerio

John Ripper

HAPS Committee Reports

Annual Conference Committee Report

David Parker, Ph. D., Chairman

Membership Committee

Kevin Petti, Chairman

Regional Conference Committee

Mary Bracken, Chairman

Grants and Scholarships—Call for Proposals 2002

Richard Faircloth, Chairman

HAPS Regional

HAPS Regional Conference—Delaware Technical & Community College

HAPS Regional Conference—Texas Style
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 & $35 for adjunct faculty and students. 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, 222 S Meramec, Suite 303, St. Louis, MO 63105. Check out our new webpage at: http://www.hapsweb.org/

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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 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.

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It is hard to believe that the academic year is over. By the time you are reading this, our first ever off the continent annual conference will be a fond memory.

There have been some notable achievements this year. One of the most obvious has been the number of regional conferences – five of them in locations from one end of the country to the other. These regional conferences enabled many old and new HAPS members to participate in the kind of activities HAPS is best known for – colleague interaction, information updates and refreshment of teaching skills. Mary Bracken has done a phenomenal job in recruiting regional conference coordinators, but she’s running out of volunteers for next year. As you know from our last newsletter, there are additional inducements for hosting such a conference. Mary (bracken@tvcc.cc.tx.us) would be really happy to hear from you.

The Board approved a recommendation made by the committee chairs that several committees (Animal Use, Cadaver Use, Distance Education) become task forces instead of standing committees. It was felt that once their goals (position statements, etc.) had been completed, that there was no reason to keep such committees in an active mode. The chairs of the task forces or committee members would continue to act as resource people for any queries arising from the membership.

The annual conference is a major highlight of the year and most members know and appreciate the amount of work that goes into making such an event a success. But this year there has been more than the usual amount of activity behind the scenes. Thanks to the efforts of Ric Martini, his committee, Dave Parker chair of the annual conference committee, Cris Martin, Past President and the HAPS Headquarters staff, several discrepancies in our conference policies and procedures have been sorted out that benefited not only this year’s conference, but will benefit future conferences as well.

Two grants were approved this year through our Grants & Scholarships Committee. The awards went to Dr. Colleen Nolan in the Department of Biological Sciences at St. Mary’s University in San Antonio, Texas, and Mr. Chad Troller, in the Biology Department at Miramar College, San Diego, California. Dr. Nolan was awarded the faculty grant for her proposal to develop and assess laboratory exercises that would provide students with an opportunity to perform experimental procedures that are commonly used in clinical and basic endocrine research.

Dr. Nolan will also look at how the performance of these procedures improves students’ understanding of endocrine physiology. Chad Troller was awarded the student grant for his proposal to obtain funds for equipment he required in an anatomy dissection course that he is taking this year. Congratulations to the grant winners! This is another example of a member benefit and I urge you to contact Richard Faircloth, Grants & Scholarships Committee Chair, if you have a project in mind that cannot be initiated because of funding. HAPS can help you!

Our President-elect, Bill Petrotti has been very busy this semester, jet-setting from one meeting to another. He represented HAPS at the AIBS Council meeting in Washington D.C. in late March. The focus of this meeting stressed the need for member associations to work together to develop public policies that would be friendly to biology. Bill also represented HAPS at the Experimental Biology meetings in Orlando, March 31- April 4. Bill was part of a symposium jointly sponsored by HAPS and the American Association of Anatomists (AAA). The title of the symposium was “Important Concepts All Undergraduates Should Understand About Human Anatomy & Physiology” and consisted of four panel members – two representing anatomy from a medical school perspective, one representing four-year college programs and one (Bill) representing two-year community colleges. Bill’s presentation entitled, “Undergraduate Anatomy Education - Threats, Challenges, and Approaches,” was well attended and well received. There was a lot of discussion of the importance of anatomy and, in particular, the importance of making anatomy an active laboratory experience. Bill will elaborate further on his presentation in a future edition of HAPS-ED. Bill has also been working on a major revision of our Constitution and Bylaws. Depending on the outcome of the discussion at the Annual General Meeting in Maui, this revision may now be in place.

I would like to turn to another topic that I have mentioned in previous issues. That is the issue of membership retention. While we continue to attract new members, there are still more people not renewing their membership. The regional directors recently did a telephone blitz of lapsed members and preliminary results indicate that many individuals have either retired from teaching or are not teaching A&P anymore. In order for us to keep our database as up to date as possible, it is vital that we...
Greetings - continued from page 2

have accurate information about our membership. If you do not wish to renew your membership because of retirement (we may have a retirement membership fee shortly) or are no longer teaching in this discipline, let HAPS headquarters know. As for you, our active members, I strongly urge you to recruit as many new members as possible (there are still vertebral mugs available!) and to contact us with any ideas you have that would attract more members.

As my term as president draws to a close, I want to thank the membership of HAPS for allowing me to be president during this past year. As has been said by one of my predecessors, "it was at various times, frustrating, exhilarating, satisfying, and demanding, but it was never boring." I also wish to express my sincere appreciation to my fellow Board members and the various committees for their outstanding efforts and support this year. Without the dedication and hard work of these individuals we would not be able to serve you, our members, in such a vital way. I particularly want to thank Cris Martin who, without hesitation, stepped in to look after any issues that arose while I was involved with personal crises.

As I hand the gavel of leadership over to our next president, Bill Perrotti, I wish him and the rest of the Board all the best in the upcoming year. Have a great summer!

HAPS 2002 CONFERENCE
Phoenix, Arizona

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For all you future focus folks, it is not too soon to be thinking about the HAPS 2002 Conference in Phoenix. In future HAPS-EDucator articles, details about Phoenix and the Conference will be provided. The purpose of this article is to entice you to come to the meeting and then spend as much time as you can exploring Arizona. The southwestern United States is a unique and inspiring place. Here are a few of its attractions.

Grand Canyon National Park (http://www.shannon tech.com/ParkVision/GrandCanyon/GrandCanyon4.html)

One of the world's seven natural wonders, the Grand Canyon offers spectacular vistas of canyon walls that have been sculpted from the earth over the millennia by the mighty Colorado River. Experience it through nature walks, mule rides into the canyon, rafting the Colorado River, or by driving around the canyon's scenic edge. Reservations a year in advance may not be too soon. The South Rim of the Grand Canyon is a five-hour drive north from Phoenix.

Sedona/Oak Creek Canyon
(http://www.sedona.net/)

The cultural community of Sedona is a mecca for art lovers and collectors. It is surrounded by the towering red sandstone cliffs of Oak Creek Canyon. In the same area, Tuzigoot National Monument (pueblo site), Jerome (a mining town), and Prescott (first permanent capital of the Arizona Territory) are worth a visit. Sedona is a two-hour drive north from Phoenix.

HAPS 2002 - continued on page 4

HAPS-EDucator - Summer 2001 - page 3
Apache Trail (http://www.americansouthwest.net/arizona/apache_trail/)

This world-famous trail was used by Apache Indians as a short cut through the mountains. The majority of the trail is unpaved but can be easily driven by most vehicles. The trail features volcanic debris, cliff-sided canyons, sparkling lakes, towering saguaro cacti and a vast array of wildflowers. The ghost town of Goldfield, the old western town of Tortilla Flat (population 6), Tonto National Monument, and the Lost Dutchman State Park are a few interesting points along the trail. The Apache Trail is a one-hour drive east from Phoenix.

Lake Powell (http://www.canyon-country.com/lakepowell/)

Lake Powell is 186 miles long and claims 1,960 miles of shoreline, more than the entire Pacific Coast of the United States. The lake is held back by Glen Canyon Dam. Water sports of all kinds are popular on the lake, such as fishing, water skiing, boating, swimming, etc. For the adventurous, the lake can be toured in rented houseboats. Lake Powell is a five-hour drive north from Phoenix.

Montezuma Castle (http://www.nps.gov/moca/)

This impressive ancient Native American cliff dwelling is more than six centuries old. It is a ninety-minute drive north from Phoenix.

Arizona-Sonora Desert Museum (http://www.desertmuseum.org/)

The Arizona-Sonora Desert Museum is a combination zoo, botanical garden, and museum. If you want to learn about the Sonora Desert, this is the place. It is a three-hour drive south from Phoenix.


Recently opened, Kartchner Caverns is one of the world's most spectacular "live" caves. The caverns feature two main chambers, each the size of a football field. Stalactites in a keidoscope of colors hang from the 100-foot ceilings and stalagmites jut out from the floors. Tours are by reservation, which should be made well in advance. Kartchner Caverns is a three-hour drive south from Phoenix.

Biosphere 2 (http://roadtrip.users4.50megs.com/biosphere/biosphere.html)

What started out as a scientific experiment, the 31.5-acre, glass-enclosed environment is one of Arizona's most popular tourist attractions. Biosphere 2 is designed to support 3,800 species of plants and animals for 100 years in its own self-sustaining biological systems. It is a two-hour drive south from Phoenix.

Kitt Peak Observatory (http://www.noao.edu/pubpage/pub.html)

For those who find astronomy fascinating, a visit to Kitt Peak is well worthwhile. It is a four-hour drive south from Phoenix. Space limits the number of places that can be mentioned.

In southern Arizona:

- Tombstone "the town too tough to die," (http://www.cityoftombstone.com/)
- Saguaro National Park (http://www.shannontech.com/ParkVision/Saguaro/Saguaro.html)
- Organ Pipe Cactus National Monument (http://www.desertusa.com/organ/du_org_main.html)

In northern Arizona:

- Petrified Forest National Park (http://www.shannontech.com/ParkVision/PetForest/PetForest.html)
- Canyon de Chelly (http://www.nearitime.com/ruins/chelly.htm)
- Monument Valley (http://moab.net/moabfilm/)

Use the HAPS 2002 Conference as a starting point for a great adventure. The unique habitat, history, and culture of Arizona are truly unrivaled.
I arrive a few minutes late for class. The students have not waited for me. I used to wonder if I would feel like a fifth wheel when this happens. Now I am delighted to see the students functioning independently. In Group A, Priscilla is drawing a flow chart of adrenal hormones on the blackboard. Group D is huddled over a drawing in a book, trying to understand the anatomy of the adrenal gland. In Group C, William is presenting his hypothesis on the diagnosis of a case study patient; Barbara and Ann are questioning some of his arguments. In Group B, the students have not yet begun their scientific discussion; Vijay is showing photographs he took on a trip last summer to see his family in India. I look over his shoulder to see the photographs; they are beautiful, mounted works of art. The students take a few minutes to look at the pictures, and then Jack goes to the blackboard to write their agenda for the day.

These undergraduate students are in a physiology class at the University of Delaware that uses problem-based learning—or PBL—a method in which students work cooperatively in groups to seek solutions to complex real-world problems. The problems are formulated to be interesting to the learners and to drive their learning. Since the students do not have all the information in advance needed to solve the problems, they must pose questions, identify what they need to know and where to find answers, and learn how to make sense of what they find.

After performing the needed research, they bring the results back to the group. Students learn to apply the course content; they develop critical-thinking abilities; and they acquire skills of lifelong learning, communication, and team building. A trained facilitator guides and supports the students’ efforts and skill development.

It is a truism of education that the best way to learn something is to teach it. In lecture-based courses, the person who usually learns the material best is the teacher. In this class, everyone becomes both a teacher and a learner.

The class is finishing a problem on reproductive physiology. The students in Group C decide that they want to understand all the hormonal changes during the female reproductive cycle, not just memorize the graphs that appear in the textbooks. The students are drawing their own multicolored graphs on the board, with arrows linking the graphs. They are going into more detail than my level of knowledge. Every so often, Paul, the faculty endocrinologist who co-facilitates this unit, joins them and asks a pointed question. The concentration is intense. First William and then Janet have a look of comprehension on their faces. Then there is scratching of heads and puzzled expressions as Tom raises a question the group hadn’t considered. This continues for a solid hour while I facilitate other groups. All of a sudden there is a burst of applause from Group C’s table. When we all turn to look, William says, “We got it!”

Janet tells me several months later how pleased the students were with themselves. They knew at the time that no exam question would cover anything like the detail they were learning, but that didn’t matter to them. They were so proud of their accomplishment that they treated themselves to a dinner out together that week.

A wealth of research indicates that students learn better and remember longer when the learning is active. It helps for students to talk together about the material, relate it to what they know, and have new information presented in the context in which it will be used. (See Norman and Schmidt in the Resources section—hereafter referred to as Res.) I am glad to know about these research findings; it’s always nice when data support what you want to do! Ultimately, each of us is most effective when we teach in a way that brings joy to our hearts (see Palmer, Res.).

I have found in PBL, a teaching method that fits who I am. I believe that we humans are by nature cooperative, not competitive. In PBL groups, the students not only solve problems, learn content, and learn how to learn, but also are engaged with one another, have permission to talk about feelings, fight, have fun, look out for one another, and occasionally care deeply about...
each other. I never had such an experience in a classroom when I was a student. My life perhaps would have been different if I had.

It is time for my monthly lunch meeting with the group liaisons. Each group has selected one of its members to fill this role for the semester. We talk about what is going on in their groups, and the students often have wonderful tips for each other. Gary asks, "What do you do when some people talk a lot and others talk very little? Does anyone else have this problem? Does it get better with time?" Sara gives him a thoughtful answer: "It gets better if you work on it." I ask her to elaborate. She explains that once her group members identified the problem, they did a check-in once a week to see how much people were speaking. The people who were quiet were encouraged to contribute their ideas more. Those who spoke frequently were encouraged to listen more. They haven't completely solved the problem and some days are better than others, but she thinks they are headed in the right direction.

Gary is listening attentively. I am delighted; an answer from me wouldn't have been nearly as effective. I have tried to train the students in the class to give feedback in ways that are useful. I am not always present when their discussions are taking place, but at this moment I know that I am making a difference in the lives of these students.

Problem-based learning was first developed about 30 years ago in Canada, to teach medical students in their first two years—the preclinical years (see Albanese and Mitchell; Vernon and Blake; and Boud and Feletti, Res.). More recently, it has been used for undergraduate and graduate education in a wide variety of fields, plus K-12 education and postgraduate programs in many continents (see Wilkerson and Gipselaars; Duch, Allen, and White; Torp and Sage; and the "Web Pages" section in Res.). Numerous instructors at all levels report that classrooms come alive, that absenteeism drops dramatically, and that no one falls asleep in class. The students are encouraged to take charge of their own learning and are assisted in developing the skills to do so.

William comes to my office to consult with me about a problem in his small group. Frank has not been carrying out his share of the work. His presentations to the group are superficial, and he usually cannot answer questions other students ask him. Things are getting bad enough that no one wants to rely on the information Frank presents, and they believe they will have to redo anything he does. William and Frank are friends; William knows Frank is capable of better work but doesn't know how to help and wants my advice. I agree that action is called for, not only for the well-being of the group but also for Frank’s benefit; he will be going to medical school and will have trouble making it to an M.D. without a change in attitude and study habits. I tell William that I think it's better to deal with this in the group than for me to talk with Frank individually, at least at first.

Once a week at the end of class, the students in each group briefly discuss how they are functioning as a team. William and Frank's group skipped that discussion last time; I suggest that as discussion leader this week William can broach the subject.
Educational Issues - continued from page 6

antages to write for the sake of writing and to use writing as a tool in sorting out their own thoughts. This approach works best if the effort is not graded at all or does not count for much: this is "low-stakes" writing.

That insight has led me to think of the discussions in PBL groups as "talking to learn." Many people are able to clarify their thinking when they voice ideas out loud and try to explain them to others. They then hear if their thoughts make sense, catch the errors, and sharpen their thinking. This requires an environment where it's OK to make mistakes, where students have time and safety and permission to think out loud.

Since this is a science class, the students are learning a new language. Sitting in lectures and taking notes does not prepare them to use scientific terminology appropriately; most of them simply have had no practice in it. At the beginning of the course, much of their expression is imprecise and fuzzy, but it improves with practice. There is no way to improve except to practice.

My biggest joys in teaching are watching students' faces as they wrestle with complex topics, seeing the students learn to function in a group, watching their pleasure when things go well—both pleasure in learning physiology and pleasure in the process—and their obvious pride when they resolve conflicts and solve problems. The students respect each other, cheer each other on, root for each other, and take turns explaining difficult concepts to one another. They make sure everyone understands the subject matter. They take pleasure when everyone in the group does well. They think, not only about the subject matter of the course but about each other. We teachers often have a picture in our heads of scholarship as a solitary activity. It need not always be so.

Problem-Based Learning Resources

The following references will help you get started learning about problem-based learning. Each cites many other sources, and the Web pages that follow have links to other PBL Web pages.


Web Pages

- Samford University PBL Web page. http://www.samford.edu/pbl
- Center for Problem-Based Learning, Illinois Mathematics and Science Academy, Web page, http://www.imsa.edu/teams/cpbl/cpbl.html

Other Resources


Editor's note: This article is an abridged version of the author's article entitled "Stories From the Field: Problem Based Learning from a Teacher's and a Student's Perspective," *Change: The Magazine of Higher Learning*, Jan.-Feb. 2000, pp. 20-27, HELDREF PUBLICATIONS, Washington, DC), for which she holds the copyright. All names of students are fictitious. For a full description of this PBL physiology course, see the article by Mierson in the Resources section. Sheila Mierson recently left the University of Delaware to start a training and consulting business, Creative Learning Solutions, Inc. Look for a companion article from a student's perspective written by Anuj A. Parikh in the Fall 2001 HAPS EDUCATOR.

Educational Issues - continued on page 8
Are we as teachers of human anatomy and physiology (A&P) ready for the revolution that genomics (the study of genomes) will bring to our classrooms? The deep understanding of fundamental mechanisms of life is crucial to understanding and teaching human physiology. Will the new ways to prevent, diagnosis and treat disease influence our teaching? In HAPS there is a rich culture of interested, dedicated teachers who wish to make learning A&P meaningful for our students. But is our professional training as “system biologists” sufficient for the future health professionals who will be using more molecular tools and techniques? Is our present teaching of genetics adequate to meet the needs of the students? With the Human Genome Organization’s leadership and the Human Genome Project/HGP’s landmark accomplishment, publication of the human genome, there is hope of leading to a new era of molecular medicine. Part of the HGP has been the genomic study of model organisms, *Escherichia coli*, *Saccharomyces cerevisiae*, *Caenorhabditis elegans*, *Drosophila melanogaster* and *Mus musculus*, which contain genes that are parallel to the genes in humans that cause disease. Did you know that Early-Onset Alzheimer Disease (PS1 gene) is found in *D. melanogaster* and *C. elegans*? Hereditary Nonpolyposis Cancer (MSH2 gene) in *D. melanogaster*, *C. elegans* and *S. cerevisiae*? Familial Cardiac Myopathy (MYH7 gene) in *D. melanogaster*, *C. elegans* and *S. cerevisiae*.

We teach the “central dogma” of molecular genetics—using DNA to make RNA, which in turn is used to sequence the amino acids into polypeptides and proteins. Of course, the epidemic of AIDS made it imperative to include the exception to the dogma because the human immunodeficiency virus/HIV is an RNA virus that requires reverse transcriptase to make the DNA template for viral production. Now what about the understanding of protein structure and its role in understanding human physiology? The genes encode patterns of protein production, the proteome. Only now with the genomic data available can attention be made to identify the functions and expression patterns of proteins involved in normal cell function and disease processes. Following close behind HGP’s accomplishments there have been efforts to form a global Human Proteome Organization/HUPO.

Obviously I am trying to make a case for us as instructors to become as knowledgeable as possible about the progress in genomics and the future molecular revolution. Although present career preparation does not stress extensive depth in genetics, more pre-professional programs are attempting to include more applicable genetics for students, whether integrated into the present curriculum or as additional courses, in human genetics. The new careers in pharmacogenetics (study of the interactions of genes and pharmaceuticals) and bioinformatics (integration of computer science to visualizing and understanding the applications derived from molecular biology) will also be avenues for some of our A&P trained students.

I fully agree that “our plates are already over-flowing.” It is difficult to prepare our students with the extensive knowledge required of health professionals today. But I feel by having them use genetics exploration about their own families, they can develop some investigative skills and interest to learn more. How can this be done? Teaching general and human genetic courses has enabled me to have resources available to assist students and answer their questions about the current status of this revolution. Since most A&P teachers do not, I offer some simple suggestions and resources that may be of assistance.

In my two-semester A&P course, I have a genetics exercise that covers activities during both semesters. It begins by “stealing” some time during the lab study of histology to do the genetics exercise, usually at the end of the commercial lab manuals. Some important additions and clarifications are needed when using these exercises: (1) most humans having a dominant disorder are heterozygotes and not homozygous; (2) behavioral variations and disorders in individuals have a large and complex genetic component; and (3) many disorders are multifactorial, making environmental influence quite important. During the first semester the students are asked to make a family pedigree and trace the inheritance of three simple traits chosen from those listed in that exercise. During the second semester the students must add to the pedigree the inheritance of blood type and some other “unique family condition,” most of the time a disorder with a potential genetic component. The student is asked to do an Internet search for information about this “unique family condition,” upgrade their pedigree and also provide a two-page referenced paper about this condition. It is no surprise that using their own families as a sampling for the study is quite interesting to them.

Now, what resources are available for you, the teacher, to best guide the student? In February of 2001, both *Science* (Vol, 291, No. 5507) and *Nature* (Vol. 409) devoted their issues to The Human Genome. It explains the two methods (private and public supported efforts), their differences in techniques and...
Educational Issues - continued from page 8

potentials for medicine and further study. There is a free kit (designed for 9-12 grade) that contains a 15-minute video documentary (both English and Spanish), on the HGP, a poster, multimedia CD-ROM and informational brochure on genomics, genetics and genetic medicine (www.ngri.nih.gov/educationikt). Students use the tape and CD-ROM in lab groups or as individuals at anytime during the two semesters. Also a report, *The Genes We Share with Yeast, Flies, Worms and Mice - New Clues to Human Health and Disease*, is an excellent resource available from the Howard Hughes Medical Institute (www.hhmi.org). In the National Human Genome Research Institute is the Human Genome Project, which has many materials and links that can assist students in searching genetic databanks for genes, locations and recent information (www.nihgri.nih.gov/HGP). At the 1999 HAPS Annual Meeting in Baltimore, Michael Palladino had a workshop to help A&P instructors use the HGP's information materials. Also at the 2001 annual conference, Ted Nannm's extensive workshops on genetics enabled teachers to learn the jargon and understand the numerous activities of this revolution.

Although initially students may see this as "another project," I have found they enjoy this project and actually learn more about genetics than that learned in the usual traditional lecture presentations. Of course, during the year, there is special effort to illustrate the inheritance patterns of some common disorders during the study of each system (only 5-10 minutes of lecture time while studying a particular system).

Making Anatomy and Physiology More Humane - Part 2

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In an attempt to make aspects of human biology, anatomy, and physiology more meaningful for students, a list of books about the human experience of disease and the role of medical scientists has been prepared. Through reading and then reporting on one of these works, students can demonstrate to the instructor that they understand the concepts more completely, and the instructor can become better acquainted with individual students.

Endocrine, Cardiovascular, Respiratory, Immune, Gastrointestinal, and Genitourinary Systems:

During the second semester of the Anatomy and Physiology sequence, we study the other organ-systems: endocrine, cardiovascular, respiratory, lymphatic, gastrointestinal, and genitourinary—and there are a variety of books to include in the reading list. Carl Djerassi, a well-known chemist involved in the development of the first oral contraceptives, wrote about his life in *From the Lab Into the World: A Pill for People, Pets, and Bugs*. Students may also be intrigued by *The Nobel Duel*, which describes the intense rivalry of two neuroscientists, Roger Guilemin and Andrew Schally, whose bitterness toward each other hampered the research process. Ironically, though they were not on speaking terms, they were forced to stand together on the stage as they accepted their part of the 1977 Nobel Prize in Medicine for the discovery of neuropeptides. Students who are particularly interested in graduate school may find these especially relevant because they connect the basic science research environment with eventual clinical results.

Understanding cardiovascular physiology often presents difficulty to students. Books such as John Stone's *In the Country of Hearts* may clarify some aspects of the cardiovascular system while introducing students to some of the art of medicine. Heart transplant pioneer William Frist's book *Transplant* also gives students perspectives on cardiac anatomy, heart surgery, and the history of heart transplants.

Currently there seems to be a proliferation of books on the immune system and infectious disease. Dominique LaPierre continues his fine literary tradition in *Beyond Love*, an inspiring story of the discovery of HIV and the early research on AZT. Even Mother Teresa is involved in this description of care for victims of AIDS. Infectious disease specialist Abraham Verghese describes his practice in Tennessee during the early days of the AIDS epidemic. Verghese's intense experience with his patients and other health professionals was pivotal in his decision to take a sabbatical from medicine and become a member of the University of Iowa's Writer's Workshop. Most students are quite unaware of the politics and personalities involved in major discoveries, so they will enjoy Robert Gallo's account of the discovery of HIV in his book *Virus Hunting, AIDS, Cancer, and the Human Retrovirus*.

The popular press is filled these days with books about infectious disease. In *Patenting the Sun: Polio and the Salk Vaccine*, author Jane Smith chronicles the horrors of

Educational Issues - continued on page 10
poliomyelitis before the development of vaccines and the extraordinary story of the Salk vaccine, including the mass immunizations of the 1950's. The role of Franklin Roosevelt is particularly emphasized. Today's students are generally uninformed about polio as a disease or the effects of polio on the activities of President Roosevelt. A fascinating and timely book, Frank Ryan's The Forgotten Plague: How the Battle Against Tuberculosis Was Won—and Lost, describes early treatments for TB, the sanatorium movement, the development of antibiotic therapy, the rise of multidrug-resistant TB, and directly-observed therapy. An account of the societal experience of tuberculosis is found in Living in the Shadow of Death: Tuberculosis and the Social Experience of Illness in American History, by Sheila Rothman. One of my favorites on infectious disease is: Yellow Fever, Black Goddess, written by Christopher Wills. This is an engaging description of the co-evolution of people and plagues, from cholera to AIDS, and it is particularly timely when one considers the development and spread of many drug-resistant microorganisms today. Historical books like these also allow students to see the historical importance of diseases, some of which are not around any longer. Problems of newly emerging infectious disease are chronicled in Laurie Garret's's The Coming Plague, and the specific challenges of hemorrhagic viruses are described in the popular The Hot Zone, by Richard Preston.

A good book on part of the gastrointestinal system is Sweet Reprieve: One Couple's Journey to the Frontiers of Medicine, by Frank Maier, an editor for Newsweek who developed liver failure and went through a liver transplant at the Mayo Clinic. In this book Maier and his wife describe his experiences as a patient and her reactions and activities during their ordeal. After reading this, students should not forget the functions of the liver or the problems with transplant rejection.

Another interesting book dealing with transplant is Thomas Starzl's Puzzle Pieces. Dr. Starzl is a pioneer in the history of kidney transplant, and his writings are included in the suggested reading in some bioethics texts.

There are many books available which address both physiological and bioethical issues of infertility. One of my favorites in this category is A Matter of Life: The Story of a Medical Breakthrough, by Edwards and Steptoe. Although this was written in 1980, before many of our students were born, it is an absorbing account of the first “test-tube” baby, written by the physician and scientist who were involved in this first successful live human birth from in vitro fertilization. A last category of suggested reading for anatomy and physiology students includes collections of essays about medicine and disease. One of America's foremost medical writers, Lewis Thomas, has written several books in this category, including The Lives of a Cell, The Fragile Species, and others. Some of my students and I have particularly enjoyed A Piece of My Mind, a collection of essays from the Journal of the American Medical Association edited by Dan and Young. These short vignettes deal with human responses to bioethical issues, life-changing experiences, and the role of medical professionals.

I encourage you as instructors of human anatomy and physiology to include some of the works listed above in your own reading and to introduce them to your students. I know that they have enriched my teaching, and I am confident that my students have gained understanding about anatomy and physiology. More importantly, perhaps, they have an expanded view of the meaning of disease in the lives of individuals and their families, and they have a better appreciation of the role of disease in history. No doubt you will find others to add to this limited list. Further information on similar literature can be found in the Literature, Arts, and Medicine Database http://endeavor.med.nyu.edu/lit-med/lit-med-db/topview. Hosted by the School of Medicine at New York University, this database is devoted to the Medical Humanities, and holds lists of literary works with a medical connection.

Editor's note: A complete list of Dr. Chapman's recommended readings will be published in HAPS EDUCATOR, Fall 2001.

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Introduction

In your introductory anatomy and physiology classes, do you ever get to cover the chapter on embryo development in any detail? If you are like me, that chapter comes at the end of a semester, leaving little time (if any) to explore the wonders of blastula formation, gastrulation, and organogenesis. Devoting lab time to an investigation of development using a living organism can provide you with the opportunity you need to both cover the details of this chapter and to elicit “oohs” and “ahhhs” from students who have spent most of a semester examining preserved specimens, models, and computer simulations.

The problem with such an approach is often finding a model organism that reliably produces embryos, can be easily manipulated/observed, has similarities to human development, and requires minimal care/preparation. An organism that meets all of these requirements and can be integrated into a lab in many different ways is *Danio rerio*, an aquarium fish more commonly known as zebrafish or zebra danio.

Zebrafish are small (1-2 inches) freshwater fish found in a variety of strains (e.g. longfin, striped, giant, gold) in most pet stores. They have become extremely important in many research laboratories that focus on vertebrate development. Furthermore, the *D. rerio* genome is on the fast track to being sequenced to allow comparison to the recently sequenced human genome (Travis, 2000).

Reproduction and Development

Reproduction in zebrafish is controlled by a photoperiod of 14 hours of light/10 hours of darkness. Within the first hour of light in the cycle, the females deposit eggs on the bottom of the tank. The males subsequently deposit sperm. At this point, a dissecting microscope clearly shows the fertilized egg adjacent to a larger yolk region. Both are contained within a clear membrane called the chorion (Figure 1A). Hatching occurs just 48 to 72 hours later, indicating how rapidly the embryo develops.

The following summary of development is adapted from the online version of *The Zebrafish Book* (Westerfield, 1995). This wonderful source is incredibly detailed in its descriptions of the cellular movements that occur during formation of tissues and organs in this animal. It also contains excellent photographs of the embryo at various stages.

The first cleavage occurs approximately 45 minutes after fertilization, with subsequent cleavages occurring about every 15 minutes (Figure 1B). Following this cleavage period (at the 128

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Figure 1. A: Within 1 hour after start of photoperiod. Note dimple (arrowhead) where membrane is starting to invaginate. B: Same embryo as in Fig. 1A, 15 minutes later. C: Approximately 4 hours after fertilization (end of blastula period). D: Approximately 26 hours after fertilization. The brain is just posterior to the eye (arrowhead). The heart is just inferior to the eye (arrow with tail). Eggs are approximately 1-2 mm in diameter.

Teaching Tips - continued on page 12

HAPS-EDucator - Summer 2001 - page 11
cell stage), the blastula period begins and lasts until approximately 5 hours after fertilization (Figure 1C). Cell divisions take longer during this time, and formation of the yolk syncytial layer (YSL) and epiboly are important events. The YSL results from the fusion of the yolk region with some of the adjacent zygotic cells and may be important for epiboly to occur. During epiboly, the embryo migrates over the yolk region (the authors liken this process to pulling a ski cap over the head).

The next stage of development is gastrulation (5-10 hours after fertilization). This period is at first marked by continuing epiboly. However, by the end of gastrulation, two primary germ layers (the epiblast and hypoblast), the embryonic axes (dorsal-ventral and anterior-posterior), and the neural plate have formed. Additionally, cell fates are now determined.

The time from 10 to 24 hours after fertilization is called the segmentation period. By now, the already existing germ layers have differentiated into the ectoderm, mesoderm, and endoderm. Somites (blocks of mesodermal tissue) begin to form in the trunk, continue toward the tail, and can be used to quickly and accurately assess the exact stage of development. Development of the notochord and rudimentary kidney, brain, and spinal cord tissues are among the other significant events of the segmentation period. Thrashing movements can be observed during this time as well.

During the pharyngula period (24 to 48 hours after fertilization; Figure 1D), the head begins to straighten and the embryo lengthens. All organs and tissues continue to grow and differentiate, and the pharyngeal arches, fins, pigment cells, heart, and blood vessels are now present.

The appearance of the mouth, jaw, and gills occurs during the hatching period (48 to 72 hours after fertilization; Figure 2A). Fin development continues and is one of the more obvious changes. Following hatching, other morphological and behavioral changes obviously occur during the next three months before the fish become adults (Figure 2B).

Figure 2. A: Approximately 50 hours after fertilization (3 mm long). B: Adult (30 mm long).

Breeding/Culture Methods

Obtaining *D. rerio* embryos for observation and manipulation is very simple. Again, the definitive methods outlined in this article are explored in more detail in *The Zebrafish Book* (Westerfield, 1995) and nicely summarized in *The American Biology Teacher* (Leake and Morvillo, 1998).

A 10-gallon tank with up to 25 fish (at least half of the fish should be female) will likely yield hundreds of eggs on a given day. The tank should be set up with a power filter and a light connected to a timer, but without gravel on the bottom of the tank. A heater should be used to keep the water temperature around 28°C. Body shape and color are used to sex the fish. Females tend to be plump, while males are thinner and have a slight yellow color, especially on the ventral side.

Fish need to be fed a diet of high protein flake food twice a day, with the occasional brine shrimp snack for a few days before and after collecting eggs. Egg production is a huge expenditure of energy, and the fish will normally eat most of the eggs to compensate. Removing the eggs results in an energy loss and ultimately a decrease in reproductive output over the succeeding days. If you want to collect eggs over several consecutive days, your best strategy is to set up additional tanks and alternate which tanks are used to collect eggs.

If the fertilized eggs drop in between the spaces of a layer of marbles, they will be inaccessible to the hungry fish. Some protocols advise covering the entire bottom of the aquarium with a single layer of marbles and collecting the eggs by siphoning the water from the bottom of the aquarium. The siphoned water can be passed through a nylon membrane with mesh fine enough to trap the eggs. However, the marbles need to be removed on days when the eggs are not harvested.

Consequently, I prefer another method in which two large (8 inch diameter) glass culture bowls, each containing a layer of marbles, are placed inside the 10-gallon tank about an hour after the last feeding for the day. Following breeding, the dishes can then be pulled out of the tanks, and a transfer pipet can be used to remove the translucent eggs from the dishes.

In either case, the marbles should be autoclaved before placed in the aquarium. This will reduce the chances of dangerous fungal or protozoan growth that can kill the embryos or newly hatched fish.

Once the marbles are in the tank, double-check the timer to make sure the light will come on about an hour before you will collect the eggs. Cover the entire aquarium with dark cloth or plastic (black garbage bags work well) to prevent disruption of the photoperiod by room lighting. The fish may have to adjust to the particular 14-hour light/10-hour dark schedule you need for a few days prior to embryo collection.

Recruit fertilized eggs about an hour after “sunrise,” using either the siphon or transfer pipet methods described above. Transfer the eggs to small (3-4 inch diameter) culture bowls with clean aquarium water or “egg water” (a 60 mg/L solution of “Instant Ocean” sea salts). Use a transfer pipet to agitate the eggs and remove the loosened debris. Some methods call for more stringent cleaning measures (even washing the eggs for 2 minutes in a 0.5% bleach solution), but I have never needed to employ them.

Once cleaned, the eggs can be moved to a more appropriate culture vessel, again containing either clean aquarium water or “egg water.” Up to 50 embryos can be cultured in 100 ml of water in a 250 ml beaker covered by a watch glass. I have more often used 25 cm² tissue culture flasks (with 10 embryos in 10-15 ml of water) and tissue culture plates with flat-bottom wells (with
Teaching Tips - continued from page 12

4 embryos in 3 ml of water). The tissue culture flasks or plates can then simply be placed on the stage of a dissecting microscope to make observations. Otherwise, the eggs will have to be transferred into and out of the beaker to depression slides or petri dishes to make microscopic observations. Regardless of which container is used, the cultures should be placed in a 28°C water bath for optimal development.

After hatching, the fry should be fed paramecia until they are large enough to handle brine shrimp. As they continue to grow, they can eventually be fed flake food.

The Zebrafish Book (Westerfield, 1995) contains many other variations on the breeding, culturing, and viewing themes presented above. It also details other laboratory protocols for more advanced cellular and molecular research work, including methods for Southern blots, Western blots, in vitro fertilization, in situ hybridization, haploid embryo production, cellular dissociation, and microinjection of embryos.

Classroom Activities

For my introductory courses, I simply want students to understand some of the basic principles of vertebrate embryology (e.g. fertilization, cleavage, cellular migration and differentiation, organogenesis) and describe specific details regarding human development. Consequently, the students complete a study guide (using both The Zebrafish Book and the appropriate chapter of the adopted text) to compare and contrast patterns and details of development in fish and humans.

Once they have successfully finished this background exercise, they use dissecting microscopes to examine zebrafish embryos. Collecting the eggs an hour after the aquarium light comes on will guarantee that the students will see the start of the cleavage period. Because cell divisions occur every 15 minutes, they can even observe cytokinesis! (Be careful of the heat from constant exposure to a microscope lamp).

Next, each group of students is given four to six living embryos at different stages of development. They identify all visible structures and place the embryos in the proper sequence of development. This prepares them to follow the development and record their observations of their original eggs over the next two days. They make a minimum of four separate observations over this time period, sketching diagrams and noting stages of development, structures identified, and other stage-specific details (e.g. heart rate, frequency of movements). Observing the excitement and intensity with which they study their developing "babies" is truly one of those moments in teaching that we all treasure. More importantly, their excitement seems to result in a more concerted effort to ask the questions and find the answers that help them to understand and learn the material.

D. rerio can be used to accomplish a variety of objectives in biology labs. Leake and Morvillo (1998) describe investigations of tissue repair and metabolic pathways. Also, breeding different strains (e.g. gold vs. striped) and characterizing the phenotype of the offspring could allow analysis of inheritance patterns (Edwards, 2000).

From a more general perspective, these organisms are a great tool to teach experimental design and data analysis. Students at any level can design and carry out quantitative investigations of factors affecting normal embryo development. The list of possible variables to explore is long and can include temperature, pH, and various teratogens (alcohol, retinoic acid) (Chang, 2000). Students could measure percent survival, time to hatching, heart rate, when a specific morphological characteristic appears, or frequency of thrashing or directed movements. The students actually are much better at brainstorming these sorts of things than I. I simply provide direction and boundaries.

If you have videomicroscopy equipment available, students can create a "video lab report" of their results (the fish are very photogenic!). In advanced classes, students could use image analysis software (e.g. Scion Image for Windows or NIH Image for Macintosh) to further quantify their data.

In my genetics class, the laboratory component is built around the "model organisms" of the field. Usually the world of education has to wait for the research world to determine what the next "classic" organism will be. Because of the ease with which its embryos can be cultured and observed, Danio rerio has emerged as a model organism at about the same time in both worlds. In fact, the Council on Undergraduate Research (2000) promotes zebrafish as one of its 10 experimental systems to involve students in research activities. Similarly, a recent report from the Howard Hughes Medical Institute describes Danio rerio as "one of the rising stars" of developmental biology and genetics research (Pines, 2001).

Whether you use this organism in a "gee whiz" lab to help students learn details of human development or in an analytical lab to help students understand the nature of science, Danio rerio is a great system to adopt into your anatomy and physiology curriculum. With some fish, a tank, and a few marbles, you can do amazing things!

References


Highlights from ANNUAL CONFERENCE COMMITTEE MEETING
Sunday, June 11, 2000, Charlotte, North Carolina
Agenda & Action(s):
David Parker, Ph. D., Chairman
Northern Virginia Community College
3001 North Beauregard Street
Alexandria, VA 22311-5097
(703) 845-6004
nvparkd@nv.cc.va.us

Policy Discussions:
1. HAPS Conference Chairperson's Registration & Banquet Dinner Expense:
   It was agreed that the Conference Chairperson's Registration and Banquet Dinner Expense should be paid for from the conference profits.
2. HAPS Conference Planning Committee Registration Fees:
   It was agreed that payment of committee registration fees was the prerogative of the Conference Chairperson.
3. Registration Fees:
   a) Fee Structure - "Early Bird," Regular, and Late/Walk-in: It was agreed that the present structure is satisfactory, but the Board will be discussing this during the 2000-2001 term.
   b) Guests - Level of Participation: There has been some discussion of instances when guests have attended all events. It was agreed that the Conference Chairperson should clarify the guest fee and what is included in this fee and published on the registration form and in the HAPS-EDucator.
   c) Student's Level of Participation: It is important to encourage students to attend and participate. It was agreed that maybe some discussion or letters to the HAPS-EDucator Editor would be helpful.
4. Conference Planning Issues:
   a) Call for Workshop Presenters:
      It was agreed that the earliest possible dates for getting presenters is important. Preferably, the forms for presenting a workshop should be available at the previous conference.
   b) List of Registrants Availability: Some of the vendors wished to contact early registrants before the conference. It was agreed that a list of registrants should be available on site during registration.

HAPS 2001 - Maui, Hawaii: The committee and chairperson wish to thank the 2001 Host Committee: Frederic (Ric) Martini, Ed Bartholomew, Kathleen Flickinger, Nishi Bryska, Sandy Lewis, and Kathleen Welch, for their continued efforts to make HAPS 2001 Annual Conference another stimulating and enjoyable conference. Also thanks should be offered to President Henry Rushin, the present HAPS Board Members and a special thanks to Past President Cris Martin for continued efforts to assist the board and the Maui Committee in emerging issues for our first "offshore" conference.

Future HAPS Annual Meetings:
1. HAPS 2002: Phil C. Tate, HAPS 2002 Annual Conference Chairperson, signed a contract on October 20th with Hyatt Regency for the conference to take place in Phoenix, AZ during May 24th-May 31st, 2002. I'm sure Phil and his committee will provided HAPS members with another memorable annual conference. Check their exhibit in Maui, the HAPS web page and HAPS-EDucator for further details. David Parker wishes to thank Bob Smoes for his successful efforts in helping Phil make the decision to be our host city.
2. HAPS 2003: A host city and committee is still needed. Since it may be time to bring the conference back to the Midwest, efforts will be made to identify potential hosts in the Central Region. Any person interested hosting for 2003, please contact Dave Parker or any Annual Conference Committee member.
3. HAPS 2004: A very strong commitment has been offered from Izak Paul, Janice Meeking and Katja Hoehn of Calgary, Alberta, Canada, to host the conference. Continued efforts will be made to make this commitment final as soon as possible.
4. The following individuals have been identified and have expressed interest in hosting future HAPS Conferences: Sandy G. Lewis (Tacoma, Washington), and Ted Namn (Boston, MA). Discussion about Cleveland, OH and Biloxi, MS (member suggested, but no contact person identified) will continue.

Current Annual Conference Committee: Cris Martin, Nishi Bryska, David Parker, Frederic (Ric) Martini, Philip C. Tate, Izak Paul, Tom Hoeoe and Sandy G. Lewis.

HAPS Committee Reports - continued on page 15
HAPS Membership Committee

Kevin Pett, Chairman
Department of Science and Health
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By the time this article is published, the annual conference in Maui will be a recent memory for many of you. For those of you who were unable to attend, I look forward to seeing you at the 16th annual conference in Phoenix, Arizona. But for all of you, I want to take a moment to report on the latest issues surrounding HAPS membership.

As you may recall, in this last fiscal year there was an effort to increase our ranks through a membership drive. I am pleased to report that as a result, we now have over 140 new HAPS members! Additionally, 18 members who had lapsed, decided to reinstate with HAPS. Listed on page 16 are the names of our newest members (and reinstated members) based on the information available at press time. Please welcome these newcomers to our Society. Special thanks also to those of you who recruited many of these new members. Listed too are those members who received the incentive lumbar mug for enlisting three new members. Thanks to all!

Alas, as with all good news, comes the not so good news. Despite this influx, our overall membership continues to remain relatively flat. For example, the 1998-99 year-end membership total was 1123 members. As of May 1, 2001, we have 1016 members — a net decline of 107 members. Another look at the data shows that HAPS has enjoyed over 450 new and reinstated members in the last three years, but has yet to experience a net gain in membership.

This issue was discussed at the mid-year meetings by the Board of Directors and committee chairs. The response was multifaceted. The first idea was to increase membership benefits so as to result in greater retention. As you are probably aware, we have more committees involved in an increasing number of activities that are beneficial to the general membership. These benefits are to be trumpeted in the members area of our newly designed web site and in the pages of this periodical. Also, regional conferences are better and more frequent than ever. Each of these events has resulted in many new members. And finally, the Board of Directors and committee chairs have agreed to directly contact by phone each of the over 300 individuals whose membership has lapsed in the last 18 months! This huge task, which will most likely conclude in the Fall semester, will yield valuable data as to why members are lapsing, and hopefully return scores to our ranks.

Ideas and efforts towards new member recruitment and retention are ongoing and will be reported in each issue of the HAPS-Educator. Once again, a warm welcome to our newest members, and many thanks to our long-term members for your support.

Regional Conference Committee

Mary Bracken, chairman
Trinity Valley Community College
PO Box 668, Terrell, TX 75160
(972) 563-9573 phone
(972) 563-1667 fax
bracken@tvcc.cc.tx.us

How would you like $50 off the registration at the next national HAPS conference PLUS free membership for a year?! Boy, are you in luck. The Board of Directors has approved awarding these generous amounts to anyone hosting a regional conference. We have members begging for conferences in their area and your Board sees the importance of meeting the needs of its members. Contact your regional director or me if you are interested in hosting a regional conference. These conferences are not that hard to do. We have a packet that gives you step-by-step instructions and a suggested timeline. Your regional director and past hosts are excellent resources for help. Regional conferences can be one- or two-day events featuring update speakers, workshops, vendors, roundtable discussions, and more.

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 18) and mail it to me. Do not wait. We need regional conferences for Spring 2002 and Fall 2002.

By the time you read this, we will have had five regional conferences in 2001. John Martin of Clark College in Vancouver, Washington reports that they had an estimated 44 attendees with 4 vendors and 6 presenters. Triton College in the Chicago with Bob Anthony at the helm sponsored a joint conference with their Chicago area A&P Society. They had over 60 attendees. Donna White and Mary Weis of Collin County Community College in Plano, TX had a 2-day affair with lots of food, excellent workshops, and informative update speakers. I was able to attend this one along with over 40 attendees. Joan Barber and Ron Klopfer of Delaware Tech College had over 40 attendees. Elizabeth Harper is offering an alternative medicine conference at New York University the end of May. I will not have the figures of their attendance until this summer.

As you can see, we are up and running. We need more local conferences. There is a member in Tennessee who would like to see one in his area. He has the money but nowhere to spend it. Won't you help?

HAPS-Educator - Summer 2001 - page 15
2000-2001 NEW MEMBERS

Mary Allard  Lynn Everett  Jeanne Lagowski  Nidia Romer
Connie Allen  Jamal Ibrahim Farhoury  Carolyn Lebsack  Herb Rosenberg
Tara Allen  Chris Farrell  Teodor Leonte  Bruce Rutherford
Marcy Anholt  Lorraine Findlay  Donald Lewis  F. Salehi
Josephine Anthony  Kathleen Flickinger  Patricia Lorenz  Mary Sargent
Susha Asokan  Ellen Ford  Joan Lukich  Loren Schrag
B. Baker  Cherie Francis  William Magill  Wanda Schwarz
Mary Lou Bareither  Marilyn Franklin  Ken Malachowsky  William Selddon
Steve Berg  Molly Frisbie  Jane Marone  Mark Sloop
Stuart Berry  Ann Fry  Chiatel Marschall  Muffie Slatter
Barbara Block  Mary Garrett  Zaira Mateo-Rodriguez  Douglas Smith
Doug Boliver  Susan Gilmore  Craig Matthew  Amanda Starnes
Laurie Bonneau  Lynn Gray  Bryan McGeachy  Kathleen Stockman
David Brady  Wesley Hanson  Michael McKinney  Mark Stout
David Campbell  Linda Hardy  Roberta Meehan  David Strom
Thomas Cappaert  Lauren Harp  Iulian Mester  Elizabeth Thomasson
Dale Champion  Valerie Harper  Michael McKinley  Diane Tice
Morris Chaney  Clare Hays  Ann Miele  Dan Trubovitz
Sheldon Clayton  Ralph Hazel  Susan Moore  Dan Ulmeanu
LaMar Cook  Rebecca Helton  Mary Moran  Rukmani Viswanath
Susan Cummings  Joan Hembree  Robert Mutch  Salma Wadud,
Randy Curtiss  Cindy Hodgson  Charlene Newby  John Walsh
Dave Dapkus  Jean Jackson  Sharon Offerdahl-Ketchum  Gerardo Watson
Rosalyne Davis  Cindy James  Terry Pardee  Leslie Wiemerslage
Theresa Dehne  Murray Jensen  Elizabeth B. Perez  Al Williams
Francois DesJardin  C.D. Johnson  Chris Perumuaa  John Wilson
Patrick DesJardin  Cynthia Johnson  Edgar Pierce  Ruth Wise
Martha Dixon  Phyllis Kaiser  Becky Polk-Pohlman  Joyce Wren
Joseph Doo Gar  Jim Kelley  Dan Porter  Karen Wynne
David Drake  Donald Kelly  Jay Poupko  Sam Zeakes
Beth Droughton  Jeffrey Kiggins  Vernihan Qaisi  Amy Zink
Christine Earls  Gary Klinger  Richard Quinn
Steven Eger  Kevin Krown  Laura Render
Beth Erviti  Tjsuanna LaBennett  Fernando Rodriguez

MEMBERS RECRUITING
THREE OR MORE NEW MEMBERS

Don Kisiel  Christine Martin  Kevin Petti  Henry Ruschin
MEMBERSHIP FORM

PLEASE CHECK ONE:

☐ NEW MEMBERSHIP  ☐ RENEWAL  ☐ CHANGE OF INFORMATION

NAME
Last Name ____________________________ First Name ____________________________
Middle Name or Initial __________ Preferred Title (Dr., Mr., Ms., Mrs.)

INSTITUTIONAL NAME ____________________________

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INTEREST SURVEY

PLEASE CHECK BOXES IF YOU ARE INTERESTED IN OR HAVE EXPERIENCE IN ANY OF THESE AREAS:

☐ USE OF CADAVERS
☐ LECTURE TESTING METHODS
☐ LAB TESTING METHODS
☐ MANAGEMENT/ADMINISTRATION
☐ IMPLEMENTING COMPUTERS IN THE CLASSROOM
☐ RADIOISOTOPE/SPECIAL CHEMICALS IN THE LAB
☐ DISABLED/LEARNING/DISABLED LEARNERS
☐ PHYSICAL FACILITIES DESIGN
☐ MUSEUM DISPLAYS
☐ GRANTS
☐ LEADERSHIP SKILLS
☐ WRITING ARTICLES, TEXTBOOKS OR MANUALS
☐ ELECTRONICS IN THE LAB

☐ COMPUTERIZED LIBRARY SEARCHES
☐ COMPUTERIZED DATA ACQUISITIONS
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☐ MULTIMEDIA PUBLISHING
☐ HTML PROGRAMMING
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COMPLETE THIS FORM AND MAIL TO: HAPS MEMBERSHIP, 222 S. MERAMEC, SUITE 303, ST. LOUIS, MO 63105.

CHECKS PAYABLE TO HUMAN ANATOMY AND PHYSIOLOGY SOCIETY for US $50 FULL TIME FACULTY, $35 ADJUNCT FACULTY/STUDENTS.
PROPOSAL FOR A REGIONAL CONFERENCE

Name of Conference Coordinator ________________________________

Coordinator's Address _________________________________________

______________________________________________________________

Phone __________________ Fax ___________________

Proposed Site/Host Institution __________________________________

Proposed Date(s) __________________________

Please supply the following information on separate sheets of paper:

- Outline of Proposed Budget
  (see Budget section of Guide for Coordinators of HAPS Local Conferences)

- 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)

Send a copy to:

Mary Bracken
Chair of HAPS Regional Conferences
c/o Trinity Valley Community College
PO Box 668
Terrell, TX 75160
bracken@tvcc.cc.tx.us
HAPS Grants and Scholarships
Call for Proposals 2002
Richard Faircloth, Ph. D., Chairman
Anne Arundel Community College
School of Arts and Sciences
Biology Department
Arnold, Maryland 21012
(410)-777-2272
Rfaircloth@mail.aacc.cc.md.us

Who: HAPS faculty members and their students

What:
Faculty grant proposals that integrate innovative and/or alternative pedagogy into existing instructional programs, e.g., developing strategies for authentic assessment of learning, diversifying the curriculum, infusing instructional technology into teaching, alternative formatting of existing courses, diversifying instructional methodology for various learning styles related to anatomy and/or physiology or the teaching of these subject areas.

Other examples include but are not limited to:
- post-graduate course work involving anatomy and/or physiology
- short-term research projects (semester or quarter in length) involving anatomy and/or physiology students as co-investigators
- research into novel curricular strategies
- return to industry projects
- clinical/practical experience
- and “Shadowing” projects

Criteria for faculty awards:
1. membership in HAPS of at least one of the applicants
2. project must relate to anatomy and/or physiology or the teaching of these subject areas
3. proposal must be exceptional in concept or expected outcome
Note: Grants are not intended to be used solely for the purchase or creation of instructional materials
Award: $1000-$1500

Student grant proposals that support, but are not limited to the following suggested purposes:
1. tuition
2. award/fees to enable students to enroll in upper level courses within the realm of anatomy and/or physiology outside of their home institution
3. research-oriented activities (e.g., short-term [1-2 semesters] independent research projects, working with scientists in public or private research laboratories), internships
4. attendance at workshops to provide students the opportunity to network with possible prospective mentors in anatomy and/or physiology

Criteria for student awards:
1. completion of, or currently enrolled in, an anatomy and/or physiology course taught by a HAPS faculty member
2. a minimum GPA of 3.0 on a 4-point scale
3. possess a positive, open attitude toward learning as judged by the sponsoring faculty member
Award: $250-750

HAPS Grants & Scholarships - continued on page 20
The Robert Anthony Scholarship for New Instructors in Anatomy and Physiology

Purpose: To encourage instructors during their first three years of teaching anatomy and physiology to network with seasoned colleagues by attending the national Human Anatomy and Physiology Society Annual Conference

Award: Covers registration fee and cost of the banquet at the annual conference

Criteria:
1. must be a HAPS member in good standing
2. must be a full-time faculty member
3. must verify his/her status by having a letter from the Department Chair or Dean stating that the applicant is full-time and in his/her first three years of teaching anatomy and/or physiology (same deadline as application)
4. have a teaching load that includes at least one section of Human Anatomy and Physiology

Why: To support the Executive Committee of the Human Anatomy and Physiology Society’s (HAPS) decision at the 1994 Annual Meeting to initiate a program of modest grants and awards for anatomy and/or physiology faculty and their students. In addition, to support the mission statement of the Society which is to promote excellence in the teaching of human anatomy and physiology.

How & When:
All grant proposals must be postmarked by February 1, 2002
(Robert Anthony deadline December 31, 2001)
Grant applications will be grouped according to geographical regions represented by HAPS. For consideration, applications must include the following (see forms on web page for details-available after June 30, 2001):
1. statement of purpose
2. explanation of how the project will enhance the applicants’ understanding/teaching of anatomy and/or physiology
3. detailed budget
4. two letters of recommendation (same deadlines)

Faculty Applicants
• letter from a colleague at the applicant’s institution.
• letter from a colleague at an external institution

Student Applicants
• letter from the sponsoring HAPS member
• letter from another faculty member
• current transcript for student applicants (same deadline)

Awards will be made public at the HAPS Annual Meeting 2002.

Grant recipients will be expected to submit to the HAPS Executive Board:
1. one interim report (for projects extending beyond six months)
2. a summary report of the completed work, including a description of the outcomes and successes of the project
3. documentation of expenditures

Grant recipients will be strongly encouraged to present their project results in the form of a workshop or poster session at the next HAPS Annual Meeting following completion of the project. Faculty and students are expected to publish an article in the HAPS-EDucator to present the project and outcomes to the membership.

Any questions regarding grants and scholarships contact
2002 HAPS Grants and Scholarship Committee Chair:
Dr. Richard Faircloth

Application forms are now available from the chair of the committee or after June 30, 2001 from the web page at www.hapsweb.org
Conference attendees at the Delaware HAPS Regional Conference were treated to a full day of fascinating keynote speakers, stimulating workshops, highly relevant exhibits, and delicious meals. The day began with a continental breakfast and was followed by the first keynote address, “Cell Surface Interactions & Embryo Implantation” presented by Dan Carson, Ph.D., University of Delaware (see summary below). One comment on the quality of this presentation was, “Even an astronomer could understand it.” There followed a choice of three workshops, all of which were well received by those who participated in them. These workshops were “Learning About the Human Genome Project via DNA Database on the Internet” by Michael A. Palladino, Ph.D. of Monmouth University; “The Use of Computer Technology in a Traditional and Distance-Learning Physiology Course” by Phil Stevens, Ph.D. of Villanova University; and “Exercise Science” (see summary below) by Mark Lafferty, Ph.D. of Delaware Technical & Community College and Meg McDowell.

Following lunch, there was a second well-received keynote presentation, “Pulmonary Function” presented by Cave Sestili, Ph.D. and Christiana Care. The afternoon workshop choices were “Genetics Labs for ‘Dummies’” by Joan Barber, Ph.D. of Delaware Technical & Community College, and “Applied Pharmacology with Emphasis on Cardiac Physiology” by Kay Deenan, B.S.N., M.S. of Delaware Technical & Community College.

Based on several comments about the conference, (“Well done. The speakers were very good.” “Glad I came!” “It was time very well spent”), those who participated in the conference garnered much information that will make them better anatomy and physiology teachers.

**Cell Surface Interactions and Embryo Implantation**

A summary of a keynote address

Dr. Carson spoke on factors modulating the attachment of mammalian embryos to the uterine wall during the process of implantation. High molecular weight, anti-adhesive mucin glycoproteins thickly coat the uterine surface under most conditions. These mucins, however, are lost or removed in response to either ovarian steroid influences or embryo-derived factors at the time of implantation, creating access to the uterine surface. Once the anti-adhesive glycoprotein on the uterine wall is out of the way, various adhesion-promoting molecules on the embryo surface, including heparin sulfate proteoglycans, are able to interact with complementary adhesion-promoting molecules on the uterine surface. This step initiates attachment of embryo to the uterine surface. One of these adhesion-promoting proteins on the uterine surface is HIF/L29, which binds heparin sulfate proteoglycans. Expression of such uterine adhesion-promoting molecules also may be controlled by ovarian steroids or embryo-derived influences. Thus, complex interactions occurring at the molecular, endocrine and paracrine levels coordinate successful embryo implantation.

**Exercise Science**

A Workshop Summary

HAPS folks were especially privileged to be able to attend a workshop in exercise science presented by Dr. Mark Lafferty and Ms. Meg McDowell on March 10, 2001. Mark showed us how to perform the Wingate Test Protocol on a stationary bicycle. He discussed the processes by which the body generates ATP and showed us how to link these to the students’ biking. Finally, Mark and some of his students illustrated a laboratory situation where data were generated for student interpretation. Meg showed us how to set up a 12-lead ECG and explained some exercises that can be done while a student is hooked up. All-in-all the workshop, by itself, made the meeting a worthwhile trip!
HAPS REGIONAL CONFERENCE
Delaware Technical & Community College

Speakers and Workshop Presenters
HAPS REGIONAL CONFERENCE
Delaware Technical & Community College

Participating in Workshops and Enjoying the Exhibits
HAPSters from the South Central US and beyond gathered at Collin County Community College in Plano, Texas March 30 – 31, 2001 for a mini-weekend of update seminars, workshops, and fellowship. It was a chance to renew old friendships and make new ones while learning the latest in biotechnology research and new teaching techniques.

The event began on Friday evening with a kick-off reception and banquet featuring Dr. Robert Benjamin of University of North Texas presenting “Genomics: The Future is Now,” a fascinating and entertaining program on the history, technology, and applications of DNA science. The evening grew short long before all questions could be answered!

The conference continued on Saturday morning with a continental breakfast of fruit, bagels, croissants, muffins, juice and coffee, all designed to clear the fog from sleepy brains before the first speaker of the day. After one last cup of coffee, it was time to get to work.

Dr. Camelia Maier of Texas Woman’s University presented “Phytoestrogens,” in which she described the structures, functions, and potential medical benefits of these interesting molecules. She also presented preliminary findings of her own research into the best dietary sources of phytoestrogens, which interestingly included a common brand of canned green beans! The final results of her study are greatly anticipated.

The second speaker of the day, Dr. David Garbers of University of Texas Southwestern Medical Center, enlightened participants on the similarities and differences between fertilization and cloning. The presentation included detailed descriptions and photographs of the removal of nuclei and their transfer between cells. For many participants, this was a great chance to get answers to all those questions posed by students.

Lunchtime was more than a chance to refuel for the afternoon workshops; it was a chance to take home a prize! Door prizes ranged from computer software sets to embroidered tote bags, a basket of gourmet cookies, CCC t-shirts and even a highly coveted HAPS lumbar vertebra mug! The atmosphere was thick with anticipation, but at the end of lunch, it was the Tyler Junior College contingent that walked away with the lion’s share of the prizes. Coincidence? Luck? Strength in numbers (7 attendees)? Inquiring minds want to know!

The afternoon provided ample opportunities for hands-on experiences. Dr. Mark Taylor of Baylor Univer-
sity presented his board game “Immunoscenarios®, a fun and interactive way to learn the complexities of the immune system. Competition was fierce with many allegations of cheating, but it was all in fun. Dr. Taylor followed up with hands-on demonstrations and activities for cell division and basic genetics that were also well received. Look for Mark and Immunoscenarios® at future HAPS conferences!

The fun continued with Starla Ewan presenting “Maniken®, Anatomy in Clay” sponsored by Zahourek Systems, Inc. Starla demonstrated various ways to use this innovative product in lab and in lecture at various educational levels. There’s nothing like playing with clay to make sense of muscles, nerves, and blood vessels!

Workshops demonstrating the latest in educational technology were presented by three of our vendor sponsors. Joe Marcinkowski of Laser Professor of Clear Lake, Inc, Russell Kelley of iWorx, and Wayne Seifert of Belhaven College sponsored by Addison/Wesley/Longman demonstrated the latest and greatest in computerized dissection, data gathering and analysis, and web tools for lab.

At the end of the day, with their feet aching and their brains full, the tired-but-happy attendees headed home to make use of what they had learned. It seems that a good time was had by all!

A big thanks goes out to the sponsors and planning committee members who, with generous contributions of time, talent, and materials, made the Plano Regional Conference a big success: Mary Weis and Donna White, conference coordinators; Doug Boliver, coordinator of vendors; Theresa Page, emcee and coordinator of speakers; Mary Bracken, chair of the HAPS Regional Conference Committee; Cathy Donald-Whitney, Deborah Cardenas, and Fred Jury, faculty in the Division of Math and Natural Sciences, CCC; Jay Norejko, Zahourek Systems; Joe Marcinkowski, Laser Professor of Clear Lake; Russell Kelley, iWorx; Linda Nelson, Benjamin Cummings; Debbie Anderson, Prentice Hall; and Steve Stembridge, McGraw-Hill.
HAPS COMMITTEES AND BOARDS

Have you ever wondered where you could obtain a standardized anatomy and physiology test? Or maybe you are thinking about an educational project and are looking for funding? Do you feel strongly about a particular issue and would appreciate an opportunity to discuss it with other HAPS members? The following committee chairs invite input from HAPS members and willingly provide information on the activities of their committees.

ANIMAL USE TASK FORCE
Craig Clifford, Chair
Northeastern State University
611 N. Grand Avenue
Telkequa, OK 74464
(918) 456-5511 x 3827
clifford@cherokee.nsuok.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.

ANNUAL CONFERENCE COMMITTEE
David L. Parker, Chair
Northern Virginia Community College
3001 North Beulavard Street
Alexandria, VA 22311-5097
(703) 845-6004
nparkd@nv.cc.va.us

The primary responsibilities of this committee are development of a standardized fees structure for the annual conference, formulation of guidelines and assistance for the conference coordinator, and generation of a calendar of conference sites.

CADAVER USE TASK FORCE
John Martin
Clark College
1800 E. McLoughlin Blvd.
Department of Biology
Vancouver, WA 98663
(360) 992-2282
jmartin@clark.edu

The goals of this committee are to develop guidelines for use of cadavers in anatomy and physiology instruction.

COMPETENCY TESTING COMMITTEE
Sam Drogo, Chair
Mohawk Valley Community College
1101 Sherman Dr.
Utica, NY 13501
(315) 792-5409
xdrogo@mvcc.edu

This committee recently completed and tested an approved HAPS Standardized Test for Human Anatomy and Physiology. Any HAPS member may obtain a copy of the test by writing to the Chair.

CORE CURRICULUM AND ASSESSMENT COMMITTEE
Dan Lemons, Chair
Dept. of Biology
City College of New York
Convent Ave. at 138th St., J526
New York, NY 10031
(212) 650-8543
daniel@harold.sci.ccny.cuny.edu

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.

DISTANCE LEARNING TASK FORCE
Tom Lancraft, Chair
St. Petersburg Junior College
Natural Science
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lancraft@email.spjc.cc.fl.us

This committee is responsible for developing and distributing a HAPS position paper on distance learning.

GRANTS AND SCHOLARSHIPS COMMITTEE
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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.

HAPS-EDUCATOR EDITORIAL ADVISORY BOARD
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Members of the HAPS-EDucator Editorial Advisory Board provide advisory and support services to the HAPS-EDucator editor such as reviewing articles and proofreading the final draft of the HAPS-EDucator before it goes to press.

MEMBERSHIP COMMITTEE
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Committee members assist the Chair with recruiting members and compiling membership information.

NOMINATING COMMITTEE
William Perrotti
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Utica, NY 13501
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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.

REGIONAL CONFERENCE COMMITTEE
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The committee provides mentoring assistance to coordinators of regional conferences. Anyone interested in hosting a regional conference should contact the Chair.

SAFETY COMMITTEE
Sandy Lewis, Chair
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The Safety Committee is developing standards for safety in the laboratory.

TECHNOLOGY COMMITTEE
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The committee monitors and reports on technological changes influencing anatomy and physiology teaching, such as advances in instructional software and data acquisition equipment.

HAPS-EDucator - Summer 2001 - page 25