Greetings From Your President
Henry Ruschin

HAPS Joins AIBS
Christine Martin Ph. D.

HAPS 2001-Maui Hawaii
A Maui Primer for HAPS 2001:
A Brief Discourse on the Pronunciation of Hawaiian Words
Edwin Bartholomew

Educational Issues
Making Anatomy and Physiology More Humane
E.S. Chapman

A Case for Discipline Based Anatomy and Physiology Programs
Deborah Canepa, Ph.D. and Jack Keyes, Ph.D.

Teaching Tips
Building Models of Tissues and Organs as a Way of Learning
Dr. Linda S. Kollett and Dr. David L. Evans

The Newspaper File as a Teaching Tool in Anatomy and Physiology Classes
Roberta M. Meehan

Pulmonary Ventilation Teaching Aid
Brad Stockert, Ph.D., PT

HAPS Regional
Some Fun Out West
Mark Bolke

Regional Conference Committee
Mary Bracken

HAPS Annual Conference in Review–Poster Session
Methods of Demonstrating and Culturing Live Chick Embryos for Undergraduate Teaching Laboratories: a Review
Nina Zanetti
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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. 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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HAPS-EDucator - Spring 2001 - page 1
As I contemplate what I want to say in this article, I am staring out my window watching the snowflakes drift lazily down. It looks quite peaceful. It has been snowing for at least 12 hours now and there is a fresh pile of about 4-5 inches on the ground. That is nothing compared to the storm that the northeastern States are supposed to receive over the next 24 hours - amounting to 2 feet! Why am I mentioning this? By the time you read this, all this snow will be but a memory.

It makes me think of how we now take for granted the phenomenal changes that have happened over the last few years. Just like remembering snowfalls in the summer, most of us have a dim recollection of what life was like before word processing, the Internet, e-mail, Power Point presentations, etc, etc. This leads me into some of the changes we will be making that take advantage of all this new electronic technology. At our recent mid-year meeting, the Board of Directors and committee chairs decided that a redesign of our web-site is needed. We plan to add a "members only" section so that members can avail themselves of materials and resources we have prepared (part of the benefits of being a member!). The type of resources that would be available on this new and improved web-site would be items such as the membership directory. The plan is to have it set up in the form of a searchable data base, where you type in a name and up pops that person’s address, phone number, etc. We anticipate that this will be a more efficient and effective way of providing this type of information. Other resources that would be available would include Position Statements and teaching/learning resources. It seems that going on-line is becoming the in thing. The American Institute of Biological Sciences (AIBS) has recently developed a web-site (www.BioOne.org) where a series of biological, ecological and environmental journals from member organizations will be available on-line. We might see some of our publications being available in this format in the future.

Turning to other issues arising from our mid-year meeting, new member Jeff Kiggins put forward a proposal for a biotechnology committee. His suggestions were well received and it was agreed that such a committee should become a sub-committee of the Core Curriculum and Assessment Committee. The biotechnology subcommittee will provide our members with information on the latest developments in molecular biology, an area that is having a major impact on our understanding of physiological processes. It is also timely since the HAPS/APS Integrative Themes in Physiology Project (ITIP), under the auspices of our Curriculum committee, is planning update seminars and workshops in physiological genomics for our 2002 annual conference being held in Phoenix, AZ.

Before our mid-year meeting, Colin Wheatley, the chair of our Publications Board stepped down from that position. Colin has (and continues to be) a strong supporter of HAPS in many ways. We value his input and while personal commitments have necessitated his leaving the Chair position, he will continue to be involved with the editorial advisory panel of the HAPS ED. At this time, I would like to welcome Caryl Tickner as our new Publications Board Chair. You know Caryl as the former editor of the HAPS ED. She held the post of secretary to the Board and is currently Regional Director for the Central Region. With that wealth of experience, we are quite pleased to have her take on this new challenge. In case you are not familiar with the Publications Board, it is responsible for overseeing all the various publications that we produce to ensure consistency of style.

We are quite fortunate in having had several successful regional conferences so far this year. We hope to continue this success. Let Mary Bracken, our Regional Conference Committee Chair, know if you are interested. They really do help keep us connected as well as help bring in new members.

Speaking of new members, we are pleased to see that several HAPS members have recruited enough new members to receive the treasured HAPS vertebra mug. Unfortunately, although we are getting new members, we continue to decline slightly in overall membership. We seem to have a relatively high rate of non-renewals, a problem we are currently looking into. It is estimated that there are about 6,000-8,000 A&P instructors in higher education. We have only reached about 20% of that population. If you have any suggestions for how we reach the other 80%, contact our Membership Committee chair, Kevin Petti, or me.

In closing, I leave you with this commentary by Peter Tauber from an article he wrote in the January/February issue of The Sciences, called "Shower Power." In his quest for ways to stimulate one’s intellectual creativity he states, "It is not just pleasurable but necessary (my emphasis) to the advancement of science for its leaders and thinkers, its doers and planners and administrators- to travel to caucuses (read: conferences) in exotic locales with terrific restaurants and great powder beaches or views.” Hmm, could he be thinking of Maui? Aloha.
HAPS Joins AIBS
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On October 28, 2000, the American Institute of Biological Sciences (AIBS) voted unanimously to accept the Human Anatomy & Physiology Society for membership. HAPS became the 76th professional scientific society to join AIBS. Other member societies with interests similar to HAPS include the American Society for Gravitational and Space Biology, the American Museum of Natural History, American Society for Photobiology, American Society of Mammalogists, and the Animal Behavioral Society.

The mission of AIBS is to provide representation for organismal and integrative biology on pressing public issues involving biological considerations, to enhance biological education and research, and to improve interaction among biological societies and disciplines.

As the AIBS council representative for HAPS, I was able to join other representatives from societies for the annual council meeting in Washington, D.C. on October 29, 2000. I was impressed with the extent of other scientific societies' knowledge of public policy with regards to the biological societies and how that policy has the potential to affect what we teach. For example, a state-by-state on-line list serves to inform members about evolution-related topics, education, and state and local politics is now being organized. If this interests you, the AIBS website will soon provide information on how to subscribe. Inquire at www.AIBS.org

At some time during the next year, our HAPS president will join other scientific society presidents for an AIBS-funded Presidential Summit to participate in discussions and resolutions on common topics affecting all areas of organismal and integrative biology. Additional areas of exploration will be centered on finding effective ways to interact with individuals in other areas of biology, science, and the country. The focus of the summit will be on public policy as it relates to scientific professional societies and education.

AIBS is an organization that represents a broad array of biologists and has a special responsibility to keep its membership informed on issues of interest in many aspects of biology education. This includes the teaching of anatomy & physiology. With the avenue of information that AIBS provides, and the goal of strengthening the AIBS network within Congress, the HAPS membership will have the opportunity to contribute to the national policy-making process. I invite you to contact me if you have any interest in this regard.

POSITIONS AVAILABLE

INSTRUCTOR OF ANATOMY AND PHYSIOLOGY - SCIENCE DIVISION

DUTIES AND RESPONSIBILITIES: The instructor of anatomy and physiology will teach Essentials of Human Anatomy and Physiology; Human Anatomy and Physiology; and Survey of Body Systems.

QUALIFICATIONS REQUIRED: Master’s degree in Anatomy and Physiology or closely related field OR master’s degree in any discipline and 24 quarter hours of graduate credit in the primary instructional assignment.

QUALIFICATIONS DESIRED:
> Ph.D. in anatomy and physiology or closely related field.
> Community college teaching experience.

CONTRACT: Faculty positions are tenure track, 180 service day contracts beginning fall term, 2001. Mt. Hood Community College does not have an academic rank system.

APPLICATION: To be considered for this position, applicant must submit:
  ✦ Completed MHCC employment application (including responses to the supplemental questions)
  ✦ Letter of formal application to the screening committee addressing how applicant meets qualifications for position
  ✦ Resume
  ✦ College transcripts of graduate work (Copies are acceptable, however, official transcripts may be requested at a later date.)

For additional information contact:
Susan Landesman
Mt. Hood Community College
S.E. Stark St.
Gresham, OR 97030
landesm@mhcc.cc.or.us
(503) 491-7335

HAPS- Educator - Spring 2001 - page 3
Hold on to your hems, caps, and carry-ons! Your arrival on the Valley Isle at Kahului Airport has placed you on Maui's windward north shore where you are likely to be hit smack-dab in the face with the 20-30 mph gusts of our cooling northeast trade winds. Unless this is a repeat visit, your landing has also placed you on an island with place names that are not only unfamiliar but also unpronounceable. A quick examination of a map of Maui will reveal an inordinate number of place names beginning with a small number of letters, especially k and h. Some examples are the airport in Kahului and your immediate destination, Kaanapali.

An important part of fitting in and adjusting to life in the Islands for malihini (newcomers) is learning the proper pronunciations of streets, public places, and other common local terms. So how do you pronounce Hawaiian words and why repeatedly use only a handful of letters to form those words? Part of the answer lies in a short Hawaiian alphabet. The Hawaiian alphabet is made up of twelve letters: seven consonants (h, k, l, m, n, p, and w); five vowels (a, e, i, o, and u) and a glottal stop, or 'okina. The glottal stop represents a whole letter in the alphabet and is indicated by ('). It is like the sound between the oh's in oh-oh. One other marking you will see is a horizontal line over a vowel. This is a macron, or kahako, which stretches out and elongates the sound of a vowel.

The following is a simple pronunciation guide, which will prepare you for the upcoming conference and enable you to impress friends back home with your ability to speak Hawaiian. Vowels with no macrons are pronounced:

A like in above, e like in bet, i like y in city, o like in own, and u like in boot. Consonants are pronounced much as in English except for the w. A w is usually like a v after e and i; usually like a w after o and u; and, to add a little confusion, like a v or w at the beginning of a word and after a. Diphthongs include e*i, eu, oi, ou, ai, ae, ao, and au, and are always stressed on the first vowel of the pair. In addition: 1.) every word must end with a vowel; 2.) every consonant must be followed by a vowel; and 3.) every syllable must end in a vowel. For easy pronunciation, divide words into syllables: Ka/hu/lu/i, and Ka/a/na/pa/li.

Unlike most of the place names on the mainland which are made up of single words (Chicago, Tampa, and Dayton), about half of all Hawaiian place names are made up of two or more words. Many contain the Hawaiian words for "the", ka or ke. (Kahului means "the winning" and Kaanapali means "the cliff"). Two place names you may already be familiar with are Honolulu (on the island of O'ahu) and Hanalei (on the island of Kaua'i). They contain two common prefixes, hana- and hono-, both of which mean "bay." (Honolulu means "sheltered bay" and Hanalei means "lei bay").

Hawaiian place names are not only based on descriptive terms, they are also based on legends, different aspects of Hawaiian culture, Polynesian names transferred with the original migrations to Hawaii, and even made anew for new development projects. Here are some topographic terms that are commonly used in place names: kai (sea), mauna (mountain peak), pu'u (hill, mound), and wai (stream, river, fresh water). Such place names on Maui include Pu'unene (goose hill) and the county seat of government, Wailuku (parting of the waters). Some adjectives occur frequently: loa (long), nui (large), iki (small) and ula (red). On your way to Maui, you should be able to see the peaks of Mauna Loa and Mauna Kea, two large volcanoes on the Big Island or Hawaii.

Now that you are familiar with place names, here are a few anatomical terms you might want to practice: ake (liver), alelo (tongue), alo (breast, stomach, front, face), e'e (arm pit), ili (skin), iwi (bone), iwi kanaka (skeleton), kua (back), lehelehe (lips), lalo po'o (brain), okole (buttocks), piko (navel), po'o (head), waha (mouth). And last but not least, one phrase that may come in handy as you renew old friendships and make new ones during HAPS 2001, (bottoms up)!

HAPS-EDucator - Spring 2001 - page 4
Making Anatomy and Physiology More Humane

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In the biological sciences, we are often criticized for requiring memorization of many facts. As in the study of history, facts are very important in biological studies, but successful memorization of facts does not offer the "whole picture." Years ago the mathematician Poincaré wrote, "Science is built up with facts as a house is with stones, but a collection of facts is no more a science than a heap of stones is a house." I have tried to assist my students in Human Biology and Anatomy and Physiology I and II to see the whole picture—that is, the meaning of scientific facts in the lives of human beings—through preparing a recommended reading list about medical scientists and the human experience of disease. Reading a book from this list offers students another view of the complicated anatomy and physiology they must learn and writing a report about their reaction to the book lends students an opportunity to be a bit more creative than they might be in a typical lab report. Sometimes through these book reports, students who have had difficulty with the necessary memorization can show the instructor that they understand the material. Moreover, the instructor gains valuable information about the students from reading their personal comments about the books. The more we understand our students' backgrounds, the better we can target their learning styles and interests. Let me give some examples from my experience.

All of us have learned more about certain injuries and diseases because people we cared about were afflicted with them. If we can apply the facts about some organ system to a real human situation, those facts become more meaningful to us. It is easy to memorize the anatomy of a tooth for a test. However, the material stays with me much longer if I recall the nerve extracted by the dentist, the X-ray showing the abscess and other steps in the process. Those who are parents probably remember the stages of labor better because they have "been there," as we say. The basic steps of hematopoiesis can be memorized, but the concepts of stem cell development and blood cell maturation are more meaningful when applied to the experience of a friend having an autologous bone marrow transplant.

Skeletal, Muscular, and Nervous Systems

During the first semester of Anatomy and Physiology, we study basic histology and the skeletal, muscular, and nervous systems. For extra credit, I offer the opportunity to read and then report on a book about human experience with problems in these organ systems. Because most students experience the greatest difficulty in understanding the material on the nervous system, I include many books on neurology and neurosurgery. I have identified these books from reviews in The New England Journal of Medicine and Journal of the American Medical Association and from browsing in bookstores and libraries, so I can recommend them to students with confidence. Here are some examples. Flying Without Wings, by Arnold Beisser MD, describes the author's experience of contracting polio just as he graduated from medical school. He was confined to an iron lung for some time, but was gradually weaned off so that he could spend time in a wheelchair. He completed a residency in psychiatry and married his nurse. For students interested in careers in rehabilitation, this story about paralysis emphasizes the importance of understanding both the central nervous system and the plasticity of human responses to such challenges.

Are you familiar with the puzzling set of symptoms called Guillain-Barre Syndrome? Joseph Heller, the author of Catch 22 and other works, developed this condition, which progressed to a severe state. In No Laughing Matter Heller wrote about the experience of recovery and the assistance he had from a friend, Speed Vogel. Each chapter describes the steps of the disease and recovery, first from the viewpoint of the patient, and then from the viewpoint of the caregiver. Students who read this book will have a greater appreciation for the pyramidal tract.

A book which should engage students interested in occupational and physical therapies is A Whole New Life by Duke University English professor Reynolds Price. In this work, Price describes his experience with bone cancer which, though in remis-

Educational Issues - continued on page 6

HAPS-EDucator - Spring 2001 - page 5
sion, confined Price to a wheelchair. Again, an excellent writer shares his experiences with us.

Books about neurosurgery abound; my favorite is When the Air Hits Your Brain: Tales of Neurosurgery, by Frank Vertosick Jr., MD. If students want to get a real glimpse of the functions and the delicate structures of the central nervous system, this book is a great start. Reading and reporting on it introduce students not only to a variety of conditions, but also to the human response to those conditions by patients, their families, and their physicians. A number of books in this category are included in the list of suggested readings.

Anything written by neurologist and author Oliver Sacks is definitely relevant to this class. Many students are somewhat familiar with Dr. Sacks from the movie adaptation of his book Awakenings, a study of both people and neurologic disease. In An Anthropologist on Mars Sacks includes seven vignettes of people with very specific neurologic disorders and describes how they have coped with and compensated for their difficulties. Another popular book by Sacks is The Man Who Mistook His Wife for a Hat, which describes the activities and coping mechanisms of people with discrete brain injuries. His stories are always presented with gentle humor and sensitivity.

For students who intend to enter a medical field, an added benefit from reading these books is the insight they receive about the roles of various health professionals. One such book is Becoming a Doctor: A Journal of Initiation in Medical School, by Melvin Konner. Dr. Konner, a noted anthropologist and physician, describes his third year of medical school, often considered the most traumatic and taxing. Koop, the autobiography of the former Surgeon General of the United States, and a fascinating account of the development of the subspecialty of pediatric surgery, introduces students to the complicated relationship between medicine and politics. There are several other books of this type, including the infamous House of God, by Samuel Shem—an extremely sarcastic view, but also valuable and humorous.

There are an increasing number of books available about biologic psychiatry. Through the years, I have found students to be relatively uninformed about affective disorders, and the role of neurotransmitters in psychiatric illnesses. Nancy Andreasen's The Broken Brain introduces students to the unfortunate and unnecessary stigma associated with psychiatric illness. Another that sheds some light on depression, in particular, is Nancy Cronkite's On the Edge of Darkness.

Another book that I highly recommend because it opens the eyes of students to the humanity of famous scientists is In Praise of Imperfection, the autobiography of Rita Levi-Montalcini, a 1986 Nobel laureate in Medicine or Physiology. Dr. Levi-Montalcini, a graduate of University of Turin (Italy) Medical School, was a member of an exceptionally talented class which included three future Nobel laureates (Salvador Luria, Renate Dulbecco, and Levi-Montalcini). Dr. Levi-Montalcini did her early work on nerve growth factor using chicken embryos in her bedroom during the Nazi occupation of Italy. She then immigrated to the US, where she continued her research at Washington University and was later awarded the Nobel Prize in Medicine.

Editor's note: Look for Dr. Chapman's commentary on suggested readings for Anatomy and Physiology II in HAPS-Educator Summer 2001.

A Case for Discipline Based Anatomy and Physiology Programs

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Courses in anatomy and physiology are required for students in a variety of majors. At the graduate level, these courses are taught separately as distinct disciplines, however at the undergraduate level they are typically taught in a combined course encompassing three college quarters or two semesters. The majority of colleges in our area teach a combined anatomy and physiology course, but we have chosen to teach anatomy and physiology as separate, one semester, sequential courses. We have used this approach for the past 18 years and have found the format to be very successful. Because of our experience, we thought it might be useful to begin a discussion with our colleagues in HAPS regarding teaching anatomy and physiology as separate sequential courses rather than as a combined sequence. In this article we discuss our reasons for teaching the courses separately. Our goal is to begin a conversation with colleagues in other institutions regarding the best ways to present these complex subjects.

Background

We teach at a satellite campus of a four year college that offers two majors, nursing and health sciences. The nursing major has approximately 300 students and the health sciences major has approximately 40 students. Ideally we would prefer that students begin their study of anatomy and physiology by first completing a year of general chemistry and a year of biology, as recommended in the guidelines for undergraduate instruction of human anatomy.
Educational Issues - continued from page 6

and physiology published by HAPS in 1994. However, because of a heavy emphasis on clinical experience in most nursing programs, there is insufficient time to include both of these prerequisites. At our school the only prerequisite to anatomy is a year of chemistry. Some of our students in the health sciences major have also completed a year of general biology and they clearly have an advantage over the nursing majors. We have found that anatomy is an essential foundation for tackling the difficult concepts of physiology. Therefore, anatomy is prerequisite to our course in physiology.

Rationale

Whereas anatomy and physiology are closely related, they are separate disciplines. When these courses are combined, some of the uniqueness of each discipline is lost. For example, in a combined course students tend to find anatomy easier to learn because it is more concrete or tangible, whereas physiology tends to be more difficult to learn because it is more conceptual. Therefore, physiological concepts frequently receive less emphasis, weakening the physiology component of the course. Even if the physiology content receives strong emphasis, we find that physiological concepts are absorbed less readily when the courses are taught as a combined sequence. Anatomy also suffers in a combined course because students must learn physiologic concepts before they have really mastered underlying details of structure. For example, dissection experience and/or more in-depth study of histology is frequently lost or diminished to make room for physiology laboratory exercises and presentation of difficult concepts. In some combined courses, anatomy is the principal content taught in the labs and physiology is relegated primarily to the classroom. We think the latter situation is difficult to defend because students benefit from lab exercises in physiology. In our experience combined anatomy and physiology courses typically emphasize anatomical structure and basic functions of the body leaving less time for in-depth study of physiological principles.

In contrast, in our anatomy course we present a basic overview of function for each system of the body in conjunction with in-depth teaching of structure. However, we defer the majority of the functional content to our separate course in physiology. Some of our faculty colleagues have argued that students learn physiology better if they are exposed to physiologic concepts at the same time they are learning anatomy. We have found this to be a false premise that is not supported with evidence from experience in teaching these subjects. On the contrary, we find that students who are trying to learn the complex concepts of physiology concurrently with anatomy tend to have more difficulty learning physiology primarily because they have not yet mastered the elements of human structure.

Key Advantages of Separate Courses

1. Because students can focus on each course as a separate discipline, they can progress to greater depth and breadth in each course. After completing anatomy, their vocabulary includes terminology for every system in the body. When they matriculate to a physiology course they use this vocabulary as a tool to help learn physiology. They do not have to think about what anatomical terms mean, but can think with those terms. As a prerequisite, anatomy gives students a critical foundation of language and structure to learn physiology. For example, after completing a course in anatomy, students can form mental pictures of organs and systems being studied in physiology. They no longer have to ask what a structure is; they can focus on what the structure does and how it works.

2. Completing a separate course in anatomy provides students with knowledge of histology they can apply to multiple organ systems while studying physiology. For example, knowledge of the microscopic structure of tissues is essential for understanding muscle contraction and membrane transport across absorptive epithelial membranes.

3. Separating the anatomy course from physiology allows greater flexibility for integrating concepts across all systems. In physiology, the teacher can make comparisons across systems more easily because students already have the anatomical basis upon which comparisons are made.

4. Separating the two courses permits use of more advanced specific texts rather than combined books. Specific texts facilitate teaching more in-depth content so students can gain a strong foundation in anatomy and physiology. These texts serve as better resources for the student during and after completing their course work in anatomy and physiology.

5. Separation permits a more extensive laboratory experience in each course. In anatomy students can complete more in-depth dissections, view and study a prosected cadaver, and devote time to study histology. Separation also permits more focused and extensive laboratory exercises in physiology separate from anatomy per se.

6. Even if advanced texts and laboratory experiences are not deemed desirable, students will absorb and retain more content if the courses are taught separately as we propose.

7. After completing a course in anatomy, a separate course in physiology guides students through a study of the human body a second time from a different disciplinary approach, thereby reinforcing concepts.

In summary, we believe that when anatomy is taught separately from physiology, students enter the course in physiology with a mental picture of the whole body as well as knowledge of its basic functions. This allows students to better develop a paradigm shift in their thinking from “what is it” to “how does it work?”

Editor's note: This article does not reflect an official position of HAPS or the HAPS Editorial Board. We welcome articles expressing an opposing viewpoint.

HAPS-EDucator - Spring 2001 - page 7
Building Models of Tissues and Organs as a Way of Learning

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Editor's note: This article contains descriptions of how student-built models of anatomical structures can be used in the classroom. Our first contributor is Linda Kollett.

My college president has told the faculty that as we teach we must also pay attention to learning. If we are “throwing” information out to our students, we are only effective if it is “caught.” The problem is that as we work to improve our “toss,” we might also find ourselves questioning just how much effort is going into the catching side of the bargain! I do know, however, that my son has a good eye and a long reach, and can out catch me on a baseball field with no trouble at all, even when I am really trying. That has led me to think a bit more about the skills, talents and experience my students bring to the classroom, and the ways I present material to them. To continue the analogy, maybe a slower pitch or a different ball might help. Using models opens up an avenue for learning that works well with what one of my students jokingly calls the “right brain group.”

I have introduced model building into the section on skeletal muscle anatomy in Anatomy and Physiology I. I begin with a traditional lecture using prepared slides, overhead transparencies, and occasionally a short movie that shows various muscle models and simulations of sliding filaments. I also integrate parts of the Muscle Module from A.D.A.M. Interactive Physiology into the lecture and strongly suggest to the students that they work with it on their own time. This combination of approaches usually works well, but there are often a few students who can’t quite figure out the three dimensional aspects of the anatomy, or are so overwhelmed by the terminology that they can’t get beyond it to see the levels of organization as clearly as they might. This is where model building can be helpful.

The Muscle System exam traditionally had a bonus question; “Perhaps you have studied something that did not appear on the exam. Write a question and answer it correctly.” Now I assign muscle cell or organ model building as a bonus option. There are no restrictions on size or materials, but the models must be clearly labeled and must be turned in on or before the day of the exam. Initially I suggested things like straws and plastic wrap. The students responded with more elaborate ideas: thick and thin spaghetti for myofibrils, clay, Styrofoam, colored hot glue, plastic modeling material, pieces of real bone, cardboard tubes, plastic buttons, carved wood! Now I just give the assignment and let them go to work.

I grade the models on accuracy, value as a teaching tool, and presentation/creativity. The point value varies but is usually somewhere between six and ten points per model. Accurate models are then placed on display in a lighted cabinet in the hallway outside the lab (Figure 1).

This is a very successful option, and students who choose to do it tell me that it has helped them to sort out levels of organization, understand the difference between myofilaments, myofibrils, cells, and fascicles, and distinguish among the associated connective tissue coverings. Some of the models are quite simple (Figure 2), while others are quite elaborate (Figures 3 and 4).

A colleague has expanded the project to involve more than skeletal muscle. Her students have constructed wonderful models of bone, skin and neurons in addition to muscles (Figures 5, 6, and 7). She suggests that they use recycled rather than store-bought materials and adds points to the final laboratory grade based on accuracy, quality, ingenuity and a presentation to the class.

Building models may not be the best use of time for every student. It is just one of several approaches in class to help the students grasp the beauty and complexity of biological structures. The finished products are often quite good, but more important are the looks of pride, satisfaction and accomplishment on the faces of the students.

Teaching Tips - continued on page 9
Teaching Tips - continued from page 8

An additional note, this semester I was delighted to see a student use this learning technique on her own to understand blood flow through the right heart; she constructed an excellent model, complete with valves, chordae tendineae and papillary muscles, using materials she found around the house.

David Evans writes of his use of student-built models in class:

I have had my Biology115/125 Human Anatomy and Physiology students do term projects for the past 11 years. I give them some guidelines saying that they can either do an illustrated talk, illustrated paper, or some large model or painting. They must provide a list of recent scientific references and the topic has to be in line with the course learning objectives. I give them clear deadlines about topic choice and final turn-in, and guide them with library research while trying to keep them away from some non-durable projects (usually either obscure or too global). I also agree to do early check-ups to make sure everything is accurate. Factual errors get hit hard.

Should they choose a model, the choice of materials is up to them. I try to guide them away from some media which experience has shown to have clear drawbacks: Styrofoam (more difficult than it looks to sculpt), modeling clay and Play Dough (both disintegrate in remarkably short times). Some of the models are quite good. Occasionally, the finished project is confused with some type of commercial product.

The whole project is only worth 5% of their total course grade but they frequently devote excessive time trying to do quality work. I do urge them to do projects related to personal interests. I have had some family genetics work that can be heart-breaking to read.

When students come to see me in later years this is one of the course components that they most frequently recall favorably. I think it is a useful learning tool and helps to bring anatomy and physiology into their personal lives.

Figures 8-12 illustrate the work of some of David’s students.

Figure 1

Figure 2

Figure 3

Figure 4

Teaching Tips - continued on page 10

HAPS-EDucator - Spring 2001 - page 9
Figure 8: Model of a cell made of fabric. The nucleus is a mass of semi-melted Styrofoam (must have smelled bad!)
Figure 9: Digestive system made of stuffed fabric.

Figure 10: Myofibril. Cover is made of fabric.

Figure 11: Fetus in modeling clay

Figure 12: Slice of skin made from a painted Styrofoam cube with pipe cleaners.
The Newspaper File as a Teaching Tool
In Anatomy and Physiology Classes

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The Newspaper File can be used quite successfully as a teaching tool in anatomy and physiology classes. Quite often anatomy and physiology students, particularly those who are clinically oriented, view the study of the human body as a part of their training. However they do not specifically relate what they are learning to what is happening outside the classroom setting.

The purpose of the Newspaper File is to demonstrate to these students that anatomy and physiology are a part of the everyday world. Whether or not they are practitioners in the health care professions, these human impact topics are very much related to what they are learning today.

Over the years, I have used a number of variations on the set up presented in this article. These variations include numbers of articles per unit time, specifics on topics, due dates, types of write-ups, etc. To facilitate this presentation I am only going to use a single set of parameters that can be altered to meet the needs of a particular instructor or group of students.

When announcing the Newspaper File, the project is generally met with a series of groans and facial distortions. (Do not pay any attention to those!) Instead, explain that the Newspaper File is a chance to see anatomy and physiology in action.

Explain that you expect three newspaper articles per week on a given topic – usually the topic you are covering in lecture. The students are to cut these three articles out of the paper or photocopy them if they do not have access to a newspaper. All articles are to be dated no earlier than the previous Sunday. At this point you will usually have a student or two claiming that there are not three articles in a week’s worth of papers that are even remotely related to the topic. In preparation for this objection, bring in a copy of the Sunday paper yourself and demonstrate that there are indeed countless articles related to your topic. (If you have never done this before, do not be nervous! The articles really are there.)

The articles are to be stapled or taped (no paper clips, please, articles get lost too easily) to a piece of paper. The articles are then to be identified with the name of the newspaper, and the date and page where the article can be found.

Allow a certain amount of leeway in the articles. For instance, an article on renal problems in dogs or cats could be acceptable because we humans develop analogous difficulties with our kidneys. Articles need not be particularly long to have an importance or a relevance to the class. For instance, a short news clip about someone being burned in a fire could be used for an article on the integument. Announce the due date for the article reviews.

Each article then needs a little write-up. You can do this quite easily on a five point system. To make grading easier, require the students to number the points. First point is the identification of the article (newspaper, date, and page). Second point is a brief summary of the article which, depending on the article, could be just a sentence or two. Third point is another specific sentence or two about how this article is related to the topic at hand. Sometimes this relationship is very obvious (as in an article on heart by-pass surgery while you are studying the cardiovascular system) but sometimes the relationship is more obscure (as in an article on elephant tusks found during the unit on the digestive system). Insist however, that the students make an objective statement about the relationship. Points four and five are for the student’s assessment of why the article is important. If the student makes a very simplistic non-thought provoking statement, award one point. If the student goes into some detail and shows some insight, award two points. Advise the students to write on only one side of the paper; it makes grading them much easier!

Grading these articles is quite simple, particularly if you use the five-point system mentioned above. The papers can be scanned and scored very rapidly. Sometimes recording the scores takes longer than actually doing the scoring. What percentage of your grade the Newspaper File will be worth is up to you.

By the end of the term, the comments on the Newspaper File are almost unanimously positive. Students generally say they like their new awareness of anatomical and physiological concepts as found in the real world. Most also say they have gained a new appreciation for their daily encounters with the applications of anatomy and physiology.
The biomechanical properties of the lungs and chest wall play an important role in ventilation. The biomechanical properties of compliance, elasticity and recoil force are fundamental to an understanding of ventilation, but they are difficult concepts for many students to understand. Changes in these properties occur with some lung disorders resulting in a change in the pattern of ventilation. The following information is designed to provide instructors with an inexpensive and effective aid for teaching these biomechanical properties. The materials needed for this demonstration are a spring loaded salad tong and several rubber bands of various thicknesses (see Figure 1).

Normal lungs exhibit inwardly directed elastic recoil; i.e., the lungs are in a stretched position and trying to decrease in size. An inwardly directed recoil force is represented by a stretched rubber band. When given the opportunity, the size of inflated lungs (or a stretched rubber band) will decrease. If the inwardly directed recoil force is unopposed the lung will diminish in size (recruit) until it reaches the residual volume. This can occur with a pneumothorax.

In contrast, the normal chest wall exhibits outwardly directed elastic recoil, i.e., the chest wall is in a stretched position and trying to increase in size. An outwardly directed recoil force is present in salad tongs when they are used to pick up salad. If the outwardly directed recoil force of the chest wall (or salad tong) is unopposed it will increase in size. The unopposed chest wall will generally increase in volume (recruit) to about 70% of the vital capacity. This also can occur with a pneumothorax.

Normally the inwardly directed recoil force of the lungs opposes the outwardly directed recoil force of the chest wall. When the muscles of respiration are relaxed, the inwardly and outwardly directed recoil forces reach a balance. This “balance point” occurs at the end of a quiet exhalation. The volume of air left in the lungs at the balance point is equal to the functional residual capacity, i.e., the residual volume plus the expiratory reserve volume. The balance point concept can be demonstrated by placing a single rubber band around the two arms of the salad tong. If you have chosen the right size rubber band and salad tongs, the apparatus will find a balance between inwardly and outwardly directed recoil forces (see figure 2). You may need to try several different rubber band sizes to make this work optimally with the salad tong.

As the muscles of inspiration contract, the chest wall expands and the volume of the lungs increases. This can be demonstrated by pulling the arms of the tongs apart. This movement stretches the lungs (rubber band) increasing the amount of inwardly directed recoil force while simultaneously decreasing the outwardly directed recoil force of the chest wall (salad tong). You can show that this movement requires a muscular effort by releasing the arms of the salad tong. The cessation of the muscular effort allows the imbalance in the recoil forces to return the apparatus back to the balance point. This situation is similar to relaxation of the inspiratory muscles at the end of inhalation. As the muscles of inspiration relax the increased recoil force of the lungs is greater than the diminished recoil force in the chest wall. The increased inwardly directed recoil force of the lungs is used to drive quiet (passive) exhalation. Exhalation will continue until the opposing recoil forces are equal once again, i.e. back to the balance point.

The salad tong and rubber band contraption can be used to explain several changes that occur with obstructive and restrictive pulmonary disorders. Some restrictive pulmonary disorders produce fibrosis in the lungs resulting in an increase in elasticity (and a decrease in compliance). Adding a second rubber band to the salad tong can be used to show the effect of pulmonary fibrosis. The students can visually see that there are more rubber bands present (an increase in elasticity and a decrease in compliance). This situation makes inhalation more difficult by requiring more muscular effort to move the chest.

[Image of salad tong and rubber bands]
Teaching Tips - continued from page 13

wall (spread the arms of the salad tongs) and inflate the lungs (stretch the rubber bands). The increase in inwardly directed recoil force also helps to explain why people with this condition can exhale so quickly.

Obstructive pulmonary disorders, e.g., emphysema, produce anatomical changes in the lungs that result in a decrease in the elasticity (an increase in compliance) of the lungs. This can be demonstrated by using a thinner rubber band than was used for the normal state (see Figure 3).

Figure 3 Thinner rubber around the arms of the salad tong.

The students can see that the thinner rubber band has fewer elastic fibers and is more compliant. When a thinner rub-

ber band is used with the salad tong, several changes in ventilatory mechanics can be demonstrated. First, inhalation is easier because the lungs are more compliant; i.e., less effort is required to spread the arms of the salad tongs. Second, the inwardly directed recoil force of the lungs, used to drive exhalation, is reduced resulting in a prolonged exhalation. Third, a “new” balance point is found between the rubber band (lungs) and the salad tong (chest wall). The spread of the salad tong arms is increased at the new balance point (compare Figures 2 & 3). This can be used to demonstrate why people with emphysema may appear “barrel-chested” or “over-inflated.” The decrease in elasticity of the lungs results in a new balance point between the normal, outwardly directed recoil force of the chest wall and the diminished inwardly directed recoil force of the lungs. The change in recoil forces results in an increase in the functional residual capacity.

HUMAN ANATOMY AND PHYSIOLOGY CLASS

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The year began with Biology 107.
Once we got through that,
We all thought we were in heaven.
Cells, tissues, organs,
Muscles, bones galore.
We were all left shouting.
“Please, Professor, no more!
Our brains are all mush!
Have mercy on our minds!
We know quite enough
About the bodies of mankind!”

But, alas, we were not at all finished yet.
What loomed ahead of us
Was as tough as it gets.
Biology 108 was an even bigger job.
We learned in great detail
What makes the heart throbb.
We learned how the lungs
Get rid of CO2
So that you stay nice and pink
Without turning blue.
By the end of the year,
We had been through it all,

Even learning why some
Are short and not tall.
Genotypes, phenotypes,
Dominant, or recessive.
We learned how genetics
Makes one gene more aggressive.

Her tests were brutal,
They made you agonize,
Over what was the answer,
The “wherefore” and “whys.”
But one thing’s for sure,
When all was said and done,
We sure knew the body,
And understood how it runs.
Methods for Demonstrating and Culturing Live Chick Embryos for Undergraduate Teaching Laboratories: a Review

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Although most undergraduate courses include units on reproduction and development, the difficulties in working with live embryos are sometimes seen as obstacles to providing laboratory exercises that reveal development as an engaging and dynamic process. Chick embryos have been used for many years as experimental organisms for embryological research. Laboratory instructors, however, often perceive the chick embryo as being ill-suited for teaching purposes, in part because of the difficulties in visualizing the embryo through the opaque shell. In addition, the earliest stages of chick embryo development (fertilization and cleavage), occur in the oviduct, and therefore are not accessible for study. Despite these limitations, chick embryos present many advantages for the undergraduate teaching laboratory. Fertilized chick eggs are inexpensive and easily obtained, provide convenient specimens with which to work, and have a relatively short (21-day) development period. With special techniques, most developmental stages (early gastrulation to late organogenesis) can be observed. Finally, chick development resembles human development in several ways, including the formation of a disc-shaped blastoderm, primitive streak, and amnion.

I have found that the following chick embryology techniques are easy and manageable for both inexperienced instructors and undergraduate students. Each technique has valuable applications for simple short-term demonstrations that are easily accomplished in a single lab session and that beautifully illustrate basic processes in embryonic development. Alternatively, each technique can be expanded and used for in-depth projects, suitable for students in advanced embryology, developmental biology courses or independent studies.

(1) Technique I: Shell-less Cultures
(Reference: Dunn et., al., 1981)

In the shell-less culture technique, the entire contents of a 3-4 day fertile chick egg are placed into a simple "culture chamber." First, the bottom part of the chamber is assembled by placing a plastic-wrap "sack" over a tripod, and then adding a plastic ring to hold the plastic-wrap in place. Then an egg is cracked open, as if into a frying pan, and its entire contents dropped into the plastic sack. Finally the chamber is completed by covering the tripod with a sterile Petri dish lid (see Dunn et al., 1981). The tripod and ring can be cut from large diameter plastic tubing or, even more easily, from a large disposable plastic cup. Once in the culture chamber, the embryo can be observed on top of the yolk where it will remain alive at room temperature for approximately 30 minutes. If an egg incubator is available, the "culture" can be incubated and observed daily to monitor the development of the embryo.

Shell-less cultures provide an exceptionally simple and convenient method for demonstrating early stages of organogenesis. When the embryos are viewed under a dissecting microscope, organ rudiments such as limb buds, eyes, brain vesicles, a beating heart, and gill arches are easily observed.

If students have access to the lab for only a single day, the instructor should set up several shell-less cultures at various times before the scheduled lab (e.g. 1 day, 3 days, 5 days), so that embryos at several different stages can be observed during the lab period. Alternatively, if the laboratory can remain open outside of normal lab hours, it is most effective to have the students set up cultures during the scheduled lab and then make daily observations to monitor the progress of "their" embryos. Embryos typically live from three to seven days after being placed in these cultures. In advanced courses, students can use the shell-less culture technique not only for observations, but also for more complicated experiments. Because the embryos in these cultures are so accessible, reagents can be added to the culture chamber, and their effects on the embryos can be monitored daily. Students in
my courses have used shell-less cultures for a variety of investigations, such as a comparison of growth and skeletal development in culture versus in ovo, and a test of the effects of biologically active chemicals (e.g. Ca++ or various teratogens) on the developing embryo.

Disadvantages of the shell-less culture technique are that it does not work for embryos younger than 3 days (early organogenesis stage), and that there is a high mortality rate (inexperienced egg handlers often find a 50% mortality rate of embryos grown in culture for 1-2 days.). Nonetheless, this is one of the simplest techniques for enabling large numbers of students to observe and experiment with chick development over the course of several days.

(2) Technique II: Spratt Cultures
(References: Johnson, 2001; Rugh, 1962; Spratt, 1947)

Of the three techniques described in this paper, the Spratt culture technique provides the only method for observing or experimenting with embryos of very early developmental stages (gastulation to early organogenesis). In this procedure, the contents of a 12 – 48 hr fertile chick egg are cracked open into a Petri dish. Then the embryo must be removed from the yolk as follows. (1) A filter paper ring is placed around the embryonic disk and allowed to adhere to the vitelline membrane. (2) Dissecting scissors are used to cut around the paper ring to separate the ring and attached embryo from the surrounding membrane. (3) The ring, with the embryo still attached, is transferred into a dish of saline G or chick Ringers. Once removed from the yolk, the embryo is easily visualized in a dissecting microscope with substage illumination. If kept warm, the embryo will continue developing for several hours in saline, or up to 48 hours if cultured on a solid agar substrate (plain agar, not nutrient agar). Because development progresses rapidly at these early stages, it is possible to observe significant structural changes even in short periods.

The Spratt culture technique provides an excellent method for demonstrating chick gastrulation (primitive streak formation) and early organogenesis (somite and neural tube formation). Embryos cultured in this way can also be used for advanced projects, such as monitoring the development of somites which form at a rate of approximately one somite pair per hour during the second day of development (approximately 23 – 35 hours of incubation, Hamburger and Hamilton, 1951). This culture system works well for investigating the effects of various bioactive chemicals on embryonic development. Advanced students with the technical skills required for microdissection can explore the question of embryonic determination by bisecting or removing portions of the embryonic disk and monitoring the subsequent development of the embryo in culture.

The chief limitations of the Spratt culture technique are that it is technically more challenging than shell-less cultures and that the embryos remain alive for only a relatively short time. Nonetheless, this method provides striking views of early stage chick embryos which otherwise could not be observed as live specimens.

(3) Technique III: Windowed Eggs
(Reference: Zwilling, 1959)

Chick eggs can be “windowed” after 3 – 4 days’ incubation. This technique provides access to the embryo for simple observations or experimental manipulations. The windowing procedure first requires that each egg be candled to locate the embryo; then a small (approximately one centimeter square) hole is cut in the shell. Before cutting the window in the eggshell, it is helpful to withdraw three to four milliliters of albumin through a small hole in the side of the egg (Zwilling, 1959). A Dremel tool [*] or dental drill works very well for cutting the window and windows are easily sealed with Parafilm [*].

Windowed eggs permit observation of the same embryonic stages as shell-less cultures. The windowing technique is more complicated, and visibility is more limited than with shell-less cultures. However, viability of the embryos tends to be higher in windowed eggs. Windowed eggs provide a useful system for a variety of experimental projects. Biologically active chemicals are easily administered through the window and can be tested for their effects on subsequent development of the embryo. It is possible to operate on an embryo through a window. For example, embryos can be tested for their ability to “regulate” following extirpation of organ rudiments or after grafting an organ rudiment into the coelomic cavity. In my classes, one of the most successful experimental applications of windowed eggs has been chorioallantoic membrane grafting. In this technique an organ rudiment, such as an eye or limb bud from a 3 – 4 day donor embryo is grafted onto the chorioallantoic membrane of an 8 – 12 day windowed host egg. Students can use this technique to explore questions such as whether limbs can develop without an ectoderm or apical ectodermal ridge, and whether limb type is determined independent of the surrounding tissues.

Summary:

Observation of living organisms provides a learning experience that cannot be duplicated using preserved specimens or visual aids. The ongoing process of embryonic development is one of the most awe-inspiring biological events, yet may be perceived as prohibitively difficult to incorporate into undergraduate laboratory exercises. The techniques described here for observing live chick embryos are easy and inexpensive, requiring little more than a source of fertile chick eggs, an incubator and a dissecting microscope. In my experience, even the simplest demonstration of live chick embryos will reliably evoke a response of “cool” or “awesome” from students regardless of their major or degree of expertise. The additional benefit of these techniques is that they can be expanded into long-term independent projects for courses that allow for a research experience. The techniques described here are simple enough to be performed by novices but challenging enough to motivate even advanced students to continue chick embryo experimentation.

When I have included long-term chick embryology projects in my Developmental Biology course, I introduce the activity by describing chick embryology and demonstrating the various techniques. The students then work in groups to learn one tech-
HAPS in Review - continued on page 16

nique and to design an experiment that uses that technique to an-
swer a biological question. Each group submits a proposal, plans a
schedule, and carries out the experiment, with help provided as
needed. At the end of the semester, the students present their results
in both a poster session and a written report.

Despite the time involved, guiding students through these
chick embryology projects is a rewarding teaching experience. One
of the best results is observing the sense of “ownership” that stu-
dents acquire as they work on their experiments over the course of
several weeks. Students typically become deeply engaged in both
the technical and theoretical aspects of their projects and invest much
more time on these projects than they would on standard lab ex-
cercises. I find it especially effective to develop projects that “build
on” experiments of previous years; students seem to find an added
incentive in knowing that their efforts are contributing to a larger,
ongoing investigation. Finally, these projects often reveal technical
or leadership skills in students, skills that otherwise might not be-
come obvious. I encourage instructors who have the necessary fa-
cilities and time to consider using these simple chick techniques as
a basis for student projects either in the laboratory setting or out-
side the formal laboratory class as a part of independent research
projects.

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lis.


Regional Conference, New York, New York

Conference Title: An Introduction to Alternative/Complementary Medicine:
Issues in Health, Research, and Education.

Sponsored by: The Health Studies Department
New York University - School of Education
35 West Fourth St., New York, New York 10012

Location: Thompson Center

Dates: Thursday May 24th, Friday May 25th 2001

Fees: $75 if paid before April 13th
$95 if paid after April 13th
$85 for HAPS members if paid after April 13th
$65 for Thursday, May 24th, only

Purpose: This conference is designed to introduce educators and professionals in the allied health fields (nursing, therapeutic
recreation, rehabilitation counseling, physical therapy, occupational therapy, applied psychology and health education, etc.) to today’s exploding arena of alternative/complementary medicine. The conference participant will be given an
opportunity to develop a deeper understanding of various alternative/complementary therapeutic treatment modalities
through experiential workshops. Update lectures will gather a variety of prominent individuals in the NYC environs
who are committed to fostering a deeper understanding of the role and value of alternative/complementary medicine in
today’s health care. Issues pertaining to health and rehabilitation, research, and education will be addressed.

PLEASE NOTE: This conference also serves as a Regional Meeting for HAPS members, particularly those who cannot
make it to Hawaii this year! Special conference fees for all HAPS members are offered.

For further information contact:
Elizabeth Harper
(212) 998-5291
ch403@nyu.edu

HAPS-Educator - Spring 2001 - page 17
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
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
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Tahlequah, OK 74464
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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.

COMPETENCY TESTING COMMITTEE
Sam Drogo, Chair
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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
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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.

HAPS-EDUCATOR ADVISORY PANEL
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Members of the HAPS-Educator Editorial Advisory Panel 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.

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.

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

NOMINATING COMMITTEE
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The committee chair is always the current President-Elect. The responsibility of the committee is to recruit nominees for the elected offices and appointed positions of the HAPS organization.

ANNUAL CONFERENCE COMMITTEE
David L. Parker, Chair
Northern Virginia Community College
3001 North Beavergard Street
Alexandria, VA 22311-5097
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The primary responsibilities of this committee are to develop a standards-based structure for the annual conference, formulation of guidelines and assistance for the conference coordinator, and generation of a calendar of conference sites.

REGIONAL CONFERENCE COMMITTEE
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Biology Department
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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.

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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.

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

SAFETY COMMITTEE
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The Safety Committee is developing standards for safety in the laboratory.

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The goals of this committee are to develop guidelines for use of cadavers in anatomy and physiology instruction.
HAPS 2001 15TH ANNUAL CONVENTION
JUNE 2-7, 2001
WESTIN MAUI
808-526-4111 OR 808-667-2525
(early reservations strongly suggested)

For Further Information Contact:
Ric Martini
800-572-2113
martini@maui.net

Watch the HAPS web page for updated information:
www.hapsweb.org