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Greetings From Your President .................................................. 3
  Philip Tate

HAPS 2004—Calgary, Alberta, Canada ........................................... 4
  Katja Hoehan, M.D., Ph.D.

The Cutting Edge
Meningioma: The Most Common Type of Intracranial Tumor ............... 9
  Sarah Cooper

Educational Issues
Teaching Anatomy and Physiology in California .................................. 12
  Deborah Caneph, Ph.D. and Jack Keys, Ph.D.

EDU-Snippets
Tantalizingly Lively Lecture Tips .................................................. 14
  Roberta Meehan and Richard Faircloth, Ph.D.

HAPS Committee Reports
Elected the Leadership .................................................................. 19
  Sandy Lewis

HAPS Northeast Regional Conference ............................................. 20
  Judith Osborn, Ph.D.

Regional Conference Committee Report ........................................... 20
  Javanika Mody

HAPS Helps Undergraduate Research Program at St. Louis Community College ...... 22
  Chaya Gopalan

HAPS 2003 in Review
Review of the Keynote Address, The Human Genome Project: .................. 23
  The End of the Beginning
  Ted Namm, Ph.D.

Review of Workshop #104, Anatomy and Physiology On-Line: ................. 24
  A First Time Experience
  Joanne Settel, Ph.D.

Review of Workshop #305, Energy Balance: What We Can (but Perhaps, .......... 26
  Should Not, and the Textbooks Don’t) Teach Our Students
  Itzick Vatnick

Review of Workshop #608, Using College Science Students ...................... 27
  as Mentors for Younger Students
  Joyce Ricker Kronberg
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Annual membership dues are $50 for full time faculty, and $35 for part-time and retired faculty. Annual membership renewals shall be due on January 1, April 1, July 1, or October 1. New members shall renew on whichever date most closely follows the date of their initial membership. **HAPS Hotline: (800) 448-HAPS (4277). Information on membership, meetings, and more! Send correspondence to: HAPS, 8000 Bonhomme, Suite 412, St. Louis, MO 63105. Check out our new webpage at: http://www.hapsweb.org/**

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

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

**CONTACT THE HAPS-EDucator Editor:** Susan Baxley, Troy State University Montgomery, College of Arts & Sciences, P.O. Drawer 4419, Montgomery, AL 36103-4419, (334) 241-5473, (334) 241-8665 fax. sbaxley@troy.edu

HAPS-EDucator - Winter 2004 - page 2
It has been a busy and exciting few months since my first presidential greeting. One of the most significant events has been the formation of a new partnership with other anatomical societies. On October 17, 2003, HAPS Executive Committee members Gail Jenkins, Sandy Lewis, and I went to Washington, DC to meet representatives from the Executive Committees of the American Association of Anatomists (AAA); the American Association of Clinical Anatomists (AACA); and the Association of Anatomy, Cell Biology, and Neurobiology Chairpersons (AACBNC). The meeting was hosted at the historic Cosmos Club (http://www.cosmos-club.org/), which was founded in 1878.

One outcome of the meeting was the formation of the Federation of American Societies for Anatomy (FASA), which consists of AAA (http://www.anatomy.org/), AACA (http://www.clinicalanatomy.org/), AACBNC (http://www.med.sc.edu:1070/), and HAPS (http://www.hapsweb.org/). On November 8, 2003, the HAPS Board of Directors (BOD) approved HAPS membership in FASA. In recognition of the growing relationships between HAPS and other societies, the BOD also approved the formation of a new committee, the Partner Associations Committee, which will be chaired by the President-Elect. In order to promote better communication and awareness between FASA members, the BOD charged the Executive Committee to develop and implement ways to share list servers and other Web site features between FASA and our partner associations.

Here are some of the highlights of the FASA meeting that could involve HAPS:

1. There has been a decrease in the number of people interested in anatomy careers. AAA and AACA offered to create a description of career options in anatomy which could be distributed to undergraduate students by HAPS members.
2. A task force shall be formed to make recommendations on the regulation of human materials transported across state lines. Christine Eckel, chair of the HAPS Cadaver Use Committee, has agreed to serve on the task force.
3. A proposal was made to form a clearinghouse for human materials. The clearinghouse would put those who have more human materials than they immediately need in contact with those who are in need of human materials. The obvious implication for HAPS is that this could be a conduit for A&P instructors who are either trying to establish, or already have an established, a cadaver program.
4. AAA is providing an electronic membership for HAPS members for $30/year (see the AAA advertisement in this issue).
5. HAPS could have a joint meeting with one of the other societies.

And speaking of conferences, the two regional conferences held this fall were great successes. Thanks to Judith Osborn and the College of Southern Maryland for hosting the meeting on “The Human/Computer Interface in A&P;” and to Tom Lehman and Morgan Community College for hosting the meeting on “Instructional Technology.” By the time you get this issue of HAPS-ED, the pre-registration information for the Calgary Conference should be available. Hosted by Izak Paul and Mt. Royal College, the meeting is going to be exceptional. And, what a fantastic place to visit before or after the conference. So register early.

And speaking of registering, membership registration and renewal is about to become an electronic reality. Although at this date there is still some work to be done; on October 31, Donna White, our Marketing Manager, informed us that she was the first HAPS member to successfully renew and pay for her membership on the Web. I am not sure why Donna chose Halloween for this announcement, perhaps there was some magic as well as some technology involved?
It is time to start planning your trip to Calgary for the 18th Annual HAPS Conference during June 12-17! Articles in the previous three issues of the HAPS-ED have described attractions in and around Calgary. See the Spring 2003 HAPS-ED for a general overview, Summer 2003 HAPS-ED for attractions within Calgary, and Fall 2003 HAPS-ED for attractions in the surrounding area. This article will give you an idea of what to expect at the meeting and some tips to help you prepare for your trip.

18th Annual HAPS Conference Highlights:

As you have come to expect from HAPS annual conferences, we have planned a terrific line-up of update speakers. Tentative Update Seminar topics will include immunology, cancer, pancreatic islet transplantation, brain functional MRIs, and modern anatomy education. A variety of excellent workshops will be offered on June 15th and 16th at Mount Royal College. The workshops are often among the most enriching experiences at the Conference since they provide a wonderful opportunity for sharing of ideas and experiences with other anatomy and physiology educators.

In addition, there will be opportunities to visit with the many vendors who so graciously support our HAPS conferences. We are planning some great sponsored events! If you are bringing guests, please remember to register them as guests so that they may accompany you to sponsored events.

One of the highlights of this conference will be a field trip to the renowned Royal Tyrell Museum of Paleontology in the town of Drumheller. This acclaimed research facility, set in the midst of the desolate Badlands, features some of the most stunning reconstructed dinosaur skeletons on Earth. For Thursday June 17th, an optional bus tour to the Rocky Mountains (including fabulous Lake Louise) has been organized.

Speak Canadian, eh!

“Eh” is a useful word to know. It is a versatile word that can be used at the end of most any sentence. It means the same as “huh” or “ya know” and also serves as a short form for “what did you say?” or “would you repeat that please?” Here are some other useful Canadianisms:

- Loonie – a $1 coin so named not because the Queen is on the front, but because a loon is on the back
- Toonie – a $2 coin
- Merican - that is you!! We like to drop the first letter of a word if the first letter is a vowel. Another example is “mazin”.
- Calgary Alburda – the correct pronunciation of where you will be….
- Zed – The last letter of the alphabet. No, it is not Zee!
- Pop – soda
- Yahoo! – The proper exclamation for the Calgary Stampede. (We do not say “Yeehaw!” here.)
- Tronno – capital city of Ontario (We like to leave out consonants where they do not seem necessary).
- Newfie – person from Newfoundland; the butt of many Canadian jokes
- Toque – a ski hat – a very valuable piece of clothing that we hope you will not need in June. But it is a dry cold, eh?!!

Calgary weather

The weather in Calgary can be unpredictable and often changes rapidly. It is said, “If you do not like the weather in Calgary, just wait a few minutes.” In June, the average maximum temperature during the day is 21°C (70°F), with a low of 7°C (45°F). Usually it is warm during the day with cool evenings. Snow is unlikely at this time of year but never totally impossible….

What to wear

Bring lightweight clothing for the meeting and a sweater and jacket or coat that you can wear outside in the evenings when it gets colder. A raincoat might be a good idea also, just in case. If you plan to do some hiking in the mountains, then bring sturdy shoes or hiking boots and warm clothes that you can layer. It can be considerably colder in the mountains. If you need to rent any outdoor activity gear, then the University of Calgary’s Outdoor Equipment Centre has all kinds of rental equipment at very good prices.
HAPS 2004 - continued from page 4

**Currency Exchange**
Although many restaurants and retailers will accept American money, you will do better exchanging your money into Canadian currency in advance if you are paying by cash or traveler’s cheque. Most places will accept major credit cards (Visa and Mastercard). You can also use automated teller machines marked with an Interac or Plus symbol to obtain Canadian currency from your own bank. This usually costs a $2 international transaction fee and the exchange rate will be that set by your bank.

**Health Insurance**
Check to see if your health insurance covers you for travel outside of the country. If not, consider purchasing travel health insurance.

**Coming into Canada**
U.S. citizens or permanent legal residents of the U.S. do not need a Visa to enter Canada. A passport is not required, but will facilitate your entry. If you do not have a passport, consider obtaining one. If not, then bring an official birth certificate and driver’s license.

**See you in Calgary!! Eh?!**

---

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HAPS 2004 Call for Workshop Proposals

Deadline for Submission: January 31, 2004

This is page 1 of 2 pages. Please fill in page 2 as well.

Name and title of presenters and abstract as they will appear in the conference program:

Presenter

Co-Presenter(s)

Workshop title

Workshop abstract (1 paragraph) to appear in conference program:
# HAPS 2004 Workshop Information

**Contact Person** 

<table>
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<tr>
<th>Last Name</th>
<th>First Name</th>
<th>MI</th>
<th>Title</th>
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**Institution** 

**Department or Division** 

**Street Address** 

**City/State/Prov.** | **Postal code**

**Country** | **Phone**

**Email** | **Fax**

---

**Type of workshop:**

- Lecture presentation
- Lab demonstration
- Lab hands-on activity
- Technology demonstration
- Technology hands-on activity
- Other demonstration
- Other hands-on activity

---

**Equipment needs:**

- Overhead projector
- LCD projector
- 35 mm slide projector
- Tables
- VCR
- Other

---

**Computer for presentation:**

- Mac
- PC
- CD-ROM
- Modem
- Internet access
- DVD

---

**Software:**

- Yes  No  Must load application program on instructor’s (demonstrator’s) computer.
- Yes  No  Must load application program on all workshop participants’ computers.

If the answer to either question is yes, you will be contacted for specifics.

---

**Workshop Specifications:**

- Yes  No  Limited number of participants?  If yes, the number of participants __
- Yes  No  Would you be willing to repeat this session?

---

**Please return the workshop proposal and workshop information forms to:**

Sue Justis, Flathead Valley Community College, 777 Grandview Drive, Kalispell, MT, 59901

For additional information:  Phone: (406)756-3866 • Fax: (406) 756-3815 • Email: sjustis@mail.fvcc.cc.mt.us

If using Email, please include HAPS in the reference line. If using FAX, write “Sue Justis” at the top of the cover page.
Deadline for Submission: January 31, 2004

Presenter ____________________________________________________________

Last Name               First Name                 MI                     Title

Co-Presenter(s) ________________________________________________________

Institution _____________________________________________________________

Department or Division _________________________________________________

Street Address _________________________________________________________

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Poster session title: ____________________________________________________

Poster session abstract (1 paragraph) to appear in the conference program:

Please return the poster session information forms to:
Herb Rosenberg, University of Calgary, Dept. of Biology, 2500 University Drive, NW, Calgary, AB, Canada, T2N 1N4
For additional information: Phone: (403) 220-6128 • Fax: (403) 289-9311 • Email: herb.rosenberg@ucalgary.ca
If using Email, please include HAPS in the reference line. If using FAX, write “Herb Rosenberg” at the top of the cover page.
Meningioma: The Most Common Type of Intracranial Tumor

Sarah Cooper
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With an incidence of at least two per 100,000, meningiomas are the most common intracranial tumor or neoplasm, comprising approximately 20% of all primary brain tumors (Mason, et al.). They arise from arachnoid cap cells of the dura mater, resemble raw hamburger in situ, and can occur anywhere along the surface of the dura mater, including the dura that covers and protects the spinal cord. Meningiomas typically attach over a wide area of the dura mater; some may invade the overlying cranial bone or cause hyperostosis of the bone, making it necessary to remove sections of skull bone when the meningioma is surgically removed (Simeone). As they grow, meningiomas frequently make indentations in the nervous tissue of the brain since the cranial bones prevent expansion of these tumors in any other direction. Some meningiomas invade the brain tissue itself causing substantial neurological problems for the patient (Mantle, et al.).

Depending on their location, meningiomas may affect any or all of the following: balance, coordination, sensory perception, motor control of skeletal muscles, memory, and personality.

The cause of meningiomas remains unknown, but many researchers, dating back to the 1800’s, have suspected that head trauma may play a role in their development. In 2002, Phillips, et al. found that head trauma, particularly when it occurred 10 to 19 years prior to diagnosis, was associated with an increased risk of meningioma. In their study, head trauma was classified as severe if it resulted in loss of consciousness or hospitalization. Oddly, according to their findings, mild head injuries were associated with a higher risk of meningioma development than were severe head injuries. Possible causal mechanisms may be related to changes that occur in meningeal tissue associated with the healing process, or with the inflammatory process associated with the injury itself. The authors advise further study before a direct connection can be made between meningioma and head trauma (Phillips, et al.).

Though the vast majority of meningiomas, at least 90%, are histologically benign, approximately 10% display some aggressive histological features such as a high degree of mitotic activity, oddly shaped cells with prominent nucleoli, and cells with micronecrotic areas (Ketter, et al.). Meningiomas displaying these features can account for significant patient morbidity and mortality (Watson, et al.). Although meningiomas are generally slow growing tumors, many cannot be completely resected due to their location in the intracranial space and the delicate nature of the brain tissue which would have to be displaced in the course of surgery. Tumors that cannot be completely surgically resected are often characterized by a high rate of recurrence accompanied by the disruption of vital and anatomically interrelated structures within the nervous system. Often these recurrent tumors are resistant to traditional medical treatment and display an aggressive histological profile with a high degree of biological activity (Akeyson, et al.). It is generally believed that recurrences represent the proliferation of microscopic tumor cells left behind after resection, but how these cells get left behind and where they reside prior to recurrence is not known (Simeone).

As revised in 1993, the World Health Organization (WHO) classifies meningiomas as either benign, atypical, or malignant based on observable features of their component cells rather than on purely histopathological findings. This system takes into account “loss of cell architecture, hypercellularity, nuclear pleomorphism, mitotic figures, focal necrosis, and brain invasion” (Akeyson, et al.). Benign meningiomas do not generally invade brain tissue and can often be completely resected depending upon their location in the cranium. Those that are most likely to cause problems by invading brain tissue, i.e. atypical and malignant meningiomas, tend to have small microscopic finger-like extensions located between tumor cells and normal brain cells. Using the WHO classification system, 93% of meningiomas are benign and designated grade I tumors, 5% of tumors are classified as atypical or grade II tumors, and 2% are classified as anaplastic or malignant tumors, grades III and IV. Malignant tumors have been manifested by brain invasion, metastasis, and rapid tumor recurrence. In general, recurrences, especially after incomplete resection, are seen in approximately 20% of patients who undergo surgery (Levicar, et al.).

Since both physicians and patients are interested in determining if a meningioma has the potential to become a recurrent problem, researchers have spent considerable time examining the cytology of these tumors hoping to find markers to
predict tumor behavior. Consequently, meningiomas are some of the most studied solid tumors with respect to their cytogenetic make up. According to Ketter, et al., the most frequent chromosomal aberration they display is monosomy 22, although this chromosomal configuration has not been shown to relate to prognosis for recovery or for tumor recurrence. Cytogenetic findings that are associated with poor prognosis for recovery and progression to atypical and malignant meningioma include hypodiploidy (loss of autosomes) other than, or in addition to, monosomy 22, and deletion of the short arm of one member of the pair of chromosome 1. Other studies have found that the percentage of cells in the S + G2/M phases of the cell cycle also correlates with clinically aggressive behavior in meningiomas and with meningioma recurrence (Akeyson, et al.).

The most common symptoms of meningioma, seizures and headaches are equally frequent in benign and malignant meningiomas. Benign meningiomas are seen twice as frequently in females as in males. Malignant meningiomas, however, usually display a male predominance or, in some studies, an equal split between the sexes. For reasons that are not understood, most malignant meningiomas are located over the convexity of the brain or in the parasagittal regions. With respect to radiological features, malignant meningiomas are approximately half as likely to show consistently shaded images on CT scans, that is, to display homologous enhancement. Malignant meningiomas are also frequently associated with moderate to severe edema on CT scans, and few malignant meningiomas are calcified, calcification being a fairly consistent characteristic of benign meningiomas. Other features that can be seen on a CT scan that correlate with aggressive behavior of meningiomas are “mushrooming” (a pattern of irregular projections of the tumor either along the surface of the brain or into the brain itself), the lack of distinct margins around the tumor (fringes of the tumor which appear to extend into underlying brain tissue), destruction of the overlying bone, large areas of low density within the tumor itself, and areas of necrosis, particularly in the center of the tumor mass. However, exact correlation of radiologic features with meningioma behavior over time is imperfect. While most meningiomas that initially appear to be aggressive on CT images are confirmed to be malignant or aggressive upon direct observation during surgery, those with a benign appearance may grow rapidly and recur quickly, display imperfect cellular features, and ultimately cause the same type of problems as aggressive meningiomas, despite the absence of accepted radiological predictors (Akeyson, et al.).

For the vast majority of meningiomas, the preferred method of treatment is surgical removal of the tumor. Many meningiomas have a profuse blood supply from the dura and adjacent bone, which can complicate surgery with blood loss. Consequently, preoperative embolization has become an important part of the surgical removal of many meningiomas. In embolization of the tumor, an effort is made to identify the primary feeder vessels of the tumor with an arteriogram. The goal is to reach the tumor’s capillary bed and obliterate its arterial feeders while preserving as much of the normal arterial circulation to surrounding brain tissue as possible to allow for proper healing of the scalp and brain after surgery. A specially trained neuroradiologist usually does this procedure. The makeup of the material injected into the arterial vessels to block blood flow to the tumor varies according to the size of the vessels that need to be embolized. Sometimes a shower of tiny glass beads is used to fill the lumen of blood vessels. Once the feeder vessels are located and the appropriate embolization materials are made ready, the embolism is injected into the tumor vessels during systole. Theoretically, the benefits of preoperative embolization of the tumor will include a reduction in the amount of blood lost during surgery, a shortening of the total time of the operation, an overall softening of the tumor making surgical manipulation of the tumor easier, and added protection of the surrounding brain tissue from the surgical trauma of tissue manipulation. The overall challenge to meningioma surgery, as in virtually all other brain surgeries, is to remove as much of the tumor as possible while leaving the patient neurologically intact. (Simeone, Akeyson, et al.).

The operation itself often starts with aspiration of the central portion of the meningioma. This softens the tumor, reduces its volume, pulls the edges of the tumor away from the dura, and usually shortens the surgical procedure while increasing the chances of achieving a complete resection of the tumor. Following aspiration, the tumor is carefully dissected from the dura (Simeone).

Since most meningiomas are slow growing tumors, they do not respond readily to conventional radiotherapy. A newer technique known as stereotactic radiation, in which a high dose of irradiation is delivered to a single small area while the meningioma is within a certain size range, may prove to be more effective than conventional radiation, particularly in the case of aggressive meningiomas. Another area under investigation for meningioma treatment focuses on progesterone binding sites that are present in many of these tumors. The observation that meningiomas are more common in females and that symptoms are often worse during pregnancy and better after delivery leads some researchers to believe that hormonal treatment with anti-progesterone drugs may be beneficial to some patients (Akeyson, et al.). As is the case with many human diseases, meningiomas are not confined only to humans, but are seen in approximately the same occurrence rates in dogs and cats. Meningiomas in non-human animals appear to have the same progesterone receptors that are common in humans (Mandara, et al.).

The mortality of patients who have had surgery for intracranial meningiomas is reported from 7% to 17% at five years. Survival rates after 10 years have been reported from 43% to 77%. An average survival of 9 years was reported in one series in which all of the tumors studied were benign meningiomas. The median survival rate for patients who had surgical removal of malignant meningiomas has been reported in various studies to be as low as 7 months. Since meningiomas can have a 20 year growth period before they become systematic and many meningioma patients are elderly, it is often difficult to determine precisely the mortality associated with the meningioma itself separate from other conditions of the patient that have contributed to mortality (Akeyson, et al.).

My interest in meningiomas grew out of my husband’s twenty-year battle with these tumors. His meningioma was very aggressive, recurrent, unrelenting, and unforgiving. It was a long fight involving excellent medical and surgical support teams and many caring doctors. Over the course of his journey with meningioma, he had five craniotomies and radiation therapy. In the end, the meningioma proved to be a formidable opponent. He passed away in the summer of 2001. He never gave up. We know
that researchers will not give up either. It is our hope that as scientists learn more about this disease and what makes seemingly benign tumors sometimes act in such destructive and aggressive ways, a cure will some day be found.

Bibliography


Introduction

Our article, “Teaching Anatomy and Physiology in the Northwest,” was published in the Summer 2003 issue of the HAPS Educator. In that article we presented data detailing how colleges teach anatomy and physiology in the Pacific Northwest, specifically Oregon, Washington, and Idaho. In this report we present data on how anatomy and physiology courses are taught in California. We compared data showing the relative numbers of colleges and universities offering anatomy and physiology as a combined course versus those institutions teaching them as separate sequential courses.

In a previous article in (HAPS Educator Spring 2001), we argued that teaching anatomy separately and as a prerequisite to physiology provides students with a better background for studying physiology. We believe that students who take anatomy prior to physiology enter the physiology course with a mental picture of the whole body and a vocabulary essential to learning body function, and an overview of the body’s basic functions. This background enables students to pursue a more in-depth course in physiology as well as to develop a better paradigm shift in their thinking from the anatomical domain of “what is it?” to the physiological domain of “how does it work?”

Methods and Data

We hired two work-study students to search college and university websites in California. We identified the schools offering a full year of anatomy and physiology and determined whether the courses were taught as combined or separate courses. We were interested in whether schools taught anatomy and physiology at a level sufficient only to prepare students for careers in allied health professions or whether the courses could also be used as preparation for graduate school. We also identified schools that taught only single courses in either anatomy or physiology or a single semester combined course in anatomy and physiology. In addition, we compared data obtained from two-year community colleges with that from four-year institutions.

We found a difference between California colleges and universities and those in the Pacific Northwest in terms of whether anatomy and physiology are taught as combined or separate courses. Ninety-five percent of the 42 community colleges in Oregon, Washington, and Idaho offer anatomy and physiology as a combined course whereas only 5% of those community colleges offered them as separate sequential courses. In California the trend is reversed; were only 30% of the 80 community colleges offered anatomy and physiology as a combined course, but 70% of community colleges offered them as separate sequential courses.

Seventy-two percent of the 43 four-year colleges and universities in the Northwest offer anatomy and physiology as a combined course and 28% offer anatomy and physiology as separate sequential courses. In California only 27% of the 48 four year colleges and universities offer anatomy and physiology as a combined course and 73% offer anatomy and physiology as separate sequential courses.

We found only one school in California that offered a full year sequence of both separated and combined anatomy and physiology. It is interesting to note that their combined anatomy and physiology course sequence was recommended for students in an associate degree program for nursing and other paramedical educational programs. This school had a higher-level separate anatomy and physiology sequence recommended for students earning a bachelors degree. We found an additional 13 schools in California that offer a full year sequence of anatomy and physiology as separate sequential courses as well as a lower level one semester combination anatomy and physiology course. The one semester combination course was frequently recommended as a prerequisite to the full year separated sequence. We also found nine schools that offered only one semester or quarter of anatomy combination.
Educational Issues - continued from page 12

or physiology. Table I lists the number of schools by state that offer a full year sequence of anatomy and physiology as a combined course. Table II lists schools in the same states shown in Table I that offer a full year of anatomy and physiology taught separately as sequenced courses.

Table I Schools offering Anatomy and Physiology as Combined Courses

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<tr>
<th>State</th>
<th>Two-Year Colleges</th>
<th>Four-Year Colleges</th>
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<tbody>
<tr>
<td>Oregon</td>
<td>13 (100%)</td>
<td>9 (53%)</td>
</tr>
<tr>
<td>Washington</td>
<td>25 (93%)</td>
<td>16 (84%)</td>
</tr>
<tr>
<td>Idaho</td>
<td>2 (100%)</td>
<td>6 (86%)</td>
</tr>
<tr>
<td>NW TOTAL</td>
<td>40 (95%)</td>
<td>31 (72%)</td>
</tr>
<tr>
<td>California</td>
<td>24 (30%)</td>
<td>13 (27%)</td>
</tr>
</tbody>
</table>

Table II Schools offering Separate Anatomy and Physiology Courses

<table>
<thead>
<tr>
<th>State</th>
<th>Two-Year Colleges</th>
<th>Four-Year Colleges</th>
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</thead>
<tbody>
<tr>
<td>Oregon</td>
<td>0</td>
<td>8 (47%)</td>
</tr>
<tr>
<td>Washington</td>
<td>2 (7%)</td>
<td>3 (16%)</td>
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<tr>
<td>Idaho</td>
<td>0</td>
<td>1 (14%)</td>
</tr>
<tr>
<td>NW TOTAL</td>
<td>2 (5%)</td>
<td>12 (28%)</td>
</tr>
<tr>
<td>California</td>
<td>56 (70%)</td>
<td>35 (73%)</td>
</tr>
</tbody>
</table>

Discussion

Seventy-one percent of the 128 California schools surveyed offer a full year of anatomy and physiology as separate sequential courses. Only 29% of those schools offer anatomy and physiology as a full year combined course. This is in marked contrast to schools in the Pacific Northwest where 84% colleges and universities offer anatomy and physiology as a combined course.

In the Pacific Northwest 28% of four-year colleges offer separate anatomy and physiology courses whereas only 5% of community colleges did so. We did not find this marked contrast between two and four-year institutions in California. Seventy three percent of four-year colleges and universities and 70% of two-year colleges in California offer separate anatomy and physiology courses. The majority of California’s two and four-year colleges teach separate sequential courses in anatomy and physiology. It is particularly interesting that schools offering both combined and separate anatomy and physiology courses design the separate sequenced courses as higher-level courses, whereas the combined format is often an introductory course. We have argued in our previous articles that teaching anatomy and physiology as separate sequential courses allows for the use of more advanced textbooks, more extensive laboratory experiences, and a greater depth and breadth in each course.

Teaching anatomy and physiology has evolved differently between colleges and universities in the Northwest and those in California. We are not aware of any pedagogical research that has directed or explains this educational outcome. Instead each school or, perhaps, region is left to decide what it wants to do. These decisions may be influenced significantly by pressure from disciplines outside of anatomy and physiology disciplines. One of the most influential pressure groups is nursing which has had a long tradition of combined courses in their diploma school programs.

The variety in teaching anatomy and physiology is also illustrated in the prerequisites recommended. We found a wide variety of recommendations and prerequisites. Many schools require no science prerequisites for their anatomy and physiology courses other than high school chemistry and biology. California colleges that offered combined anatomy and physiology courses were slightly more likely to require no science prerequisites as compared to colleges that offered separate sequential courses. However, the opposite was true in Northwest colleges and universities. Some California schools recommended either chemistry or biology as a prerequisite for their courses and some required both chemistry and biology as prerequisites. We did not find a marked contrast between the requirements of combined and separated anatomy and physiology courses. However, we did note that colleges offering separate physiology courses were more likely to require chemistry as a prerequisite.

In the states we have surveyed, anatomy and physiology are typically service courses for other majors. Because anatomy and physiology are service courses, we question why there is such variation in how the courses are taught. Who decides whether they are taught as a combined or separate sequence? Who decides what kinds of prerequisites are appropriate for teaching anatomy and physiology? What are the criteria used for such decisions? There are many stakeholders in the decision-making process for anatomy and physiology courses, but who has the final responsibility in terms of how they are taught? Do the educational institutions benefit from a combined or separate sequence for these courses? There are many questions to which we do not have answers; however, from our perspective, it seems that, whereas we who teach anatomy and physiology cannot operate in isolation, these kinds of decisions are the responsibility of the professionals teaching anatomy and physiology and are not exclusively the domain of the disciplines or institutions served by the courses we teach.

We are continuing our investigation into how courses in anatomy and physiology are taught in the United States. These data will be a part of the information package we are reviewing as we begin to evaluate the best methods for teaching anatomy and physiology. We welcome input from any anatomy or physiology professors who would like to assist us in investigating a particular region or state. Such exchange would have the added benefit of increasing communication among HAPS members. We would also like to know your views concerning the issues we have raised in this article. Please feel free to write to us at the email addresses included with this article.

We appreciate the excellent help provided by our students, Summer Ives and Jessica Walker, in searching and reviewing college and university websites.
EDU-Snippets is a column designed to let you—the HAPSters—share your personal or institutional educational experiences. So, here are this edition’s contributions!

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

I. Edu-Quickies

A. Reflexes and Eying the Problem

Ken Saladin (Georgia College & State University, ksaladin@alltel.net) sent us several quickie lecture enliveners. All of them sound like real interest grabbers! Here is what Ken said:

When lecturing on somatic reflexes, I sometimes have a volunteer come to the front of the room and stand with his/her left hip and shoulder firmly against a wall, and try to lift his/her right foot without losing contact with the wall. It is, of course, virtually impossible to do because the wall prevents one from shifting the body weight over the left foot. I can make some points about contralateral and intersegmental reflexes with this demonstration.

Another is to have one or more class members squeeze hard on some object in the hand (like a tennis ball or one of those gel-filled “stress relievers”) at the approximate frequency of the heartbeat (a little faster than once/sec) until the flexor muscles are well fatigued, and make a point from this about the relative fatigue-resistance of cardiac vs. skeletal muscle.

The demonstration of the blind spot is done by having the students hold up a pen or pencil and moving it so the tip of it vanishes.

Determining the dominant eye is another easy one. Tell the students to keep both eyes open and quickly point to a distant object (focusing on the object). While keeping the pointing finger steady, they should open and close one eye at a time. The eye that is open when the finger seems to be exactly on the object is the dominant eye.

B. Darkness, Please!

Meanwhile, Karen McMahon (University of Tulsa, karen-mcmahon@utulsa.edu) told us…

My lecture enlivener works only if you are stuck in a windowless classroom that is absolutely dark when the lights are out. Turn out the classroom lights and turn on a small penlight with the bulb facing toward you. Close your mouth over the light. Your facial bones with sinuses will glow lighter because of the eerie air pockets.

C. The Gravity of Blood

Phil Stephens (Villanova University, phil.stephens@villanova.edu) gave us a quick and easy way to help students visualize gravity.

Here is a something for ALL students in a lecture to demonstrate very vividly gravity and blood flow in the veins. Tell the students to point the (non-writing) hand towards the floor and to keep the arm reasonably straight. After about 30 seconds (or at the next break in lecture) have the students look at the inside of their wrists (or backs of their hands) and “see” the veins. Now tell them to bring the wrist (hand) up to a position level with the eyes (or higher) and watch the veins “disappear.”

D. Sarcomere Snacks

Mary Kay White (Brevard College, whitemk@brevard.edu) uses food to make the sarcomeres real!

When going over the sarcomere, I first use stranded wire to represent the myofibrils. I then cut one small section of one small strand of wire and tell the students that that represents a sarcomere, the functional unit of contraction. I then tell them we are going to magnify the sarcomere to see what is inside. I then distribute thin pretzels (to represent thin filaments) and either thicker pretzels or red licorice (to represent thick filaments) and two pieces of black...
Students sometimes have difficulty with proprioceptors. So, as a bit of fun, in addition to some solid teaching, I have them put down their pens and close their eyes. Then I tell them to touch the fingertips of the left hand to the fingertips of the right hand. I give them more instructions, such as:

1. Touch your left index finger to your right ear lobe.
2. Touch your right index finger to your left knee.
3. Stand up
4. Take 3 steps to the left
5. Turn around 360 degrees
6. Point to the ceiling
7. Take 3 steps to your right
8. Find your chair and sit down

I continually remind them to keep their eyes closed. When they are all seated, I tell them to open their eyes and that they did all of these things with their proprioceptors. These (proprioceptors) tell you where your body parts are in space, (where your finger tips are and where your ears are, etc.), which way is up, which way is left and right. They help you to balance, etc.

The students have a bit of fun and, when we are finished, they all know what proprioceptors are.

D. Simulating Neurotransmitters

Mary Kay White (Brevard College, whitemk@brevard.edu) sent us a terrific idea for demonstrating neuronal action.

I have each person pretend to be a neuron and stand up with arms out from the body and with kidney beans in one hand. One arm then represents the dendrite, and the arm with the kidney beans represents the axon. The students pair up with another person in class and identify who is the presynaptic neuron and who is the postsynaptic neuron. The first neuron “fires” and says out loud, “The nerve impulse goes through my dendrite (perhaps the left arm), into my cell body (the student’s own body), then out my axon (the right arm).” The student then identifies the synaptic vesicle (the fist), the neurotransmitter (the kidney beans), and the synaptic cleft (between the fist and the other person’s dendrite). After the neuron fires, the student gets the neurotransmitter (kidney beans) back, indicating that the neurotransmitter is recycled and does not travel down the neuron.

We also use dominos to indicate subthreshold vs. threshold stimuli. When a threshold stimulus fires, the dominos fall (depolarize) then go back up (repolarize) as the neuron prepares for another stimulus. At the location of the last domino, the students place kidney beans, indicating, again, that the neurotransmitter does not travel down the neuron, but is released at the axon terminal. The kidney bean can then be pushed to another set of dominos (postsynaptic neurons) to initiate a nerve impulse (action potential) at that location.

E. Medical Terminology “Dictionary” Game

Marjorie Pearsall (Anne Arundel Community College, m.pearsall@g@att.net) has an interesting way for us to teach some of those laborious parts of medical terminology.

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Edu-Snippets - continued on page 14

licorice to represent the Z lines or discs. The students are instructed first to set down on their tables the two pieces representing the Z discs—like “goal posts.” Then they are asked to use their notes or book to set up the thin and thick filaments correctly and to identify the I band, A band, H zone, etc. They finally demonstrate the sliding filaments by pushing the “goal posts” closer together and answer questions about what happens to the width/length of the thin filament, thick filament, sarcomere, and the bands/zones. This helps the students picture what happens with a muscle contraction.

II. A Tad Longer

Some of our HAPSters sent us contributions that could not really be classified as Edu-Quickies because they really do take a bit more time. But, we think you will find these to be valuable ideas anyway!

A. Multi-Purpose Idea

Linda Banta (Sierra College, lbanta@sierracollege.edu) gave us a multi-purpose idea. My class has periodic unannounced quizzes in lecture. These generally take 10 – 12 minutes. I go over them immediately, then call on students to answer specific questions using the names from the papers. In this way, I learn names more quickly, and early in the term students find they may be called upon very randomly even though I do not know most of them by name.

A result of doing this routinely gets students accustomed to speaking up in class; the carry-over is that they will then be much more likely to ask when they have questions. Instead of sitting silently and becoming more lost in the new material, they loose their hesitancy to raise their hands and ask for clarification. If you use this technique, pay close attention to students’ expressions and learn to “read” when they have a question they have not yet verbalized. Then ask them by name if they are OK with the information. Once students understand you are “question friendly,” learning progresses much more readily.

B. Wisconsin Wave

Charlene Newby (Lakeshore Technical College, Charlene.newby@gotoltc.edu) sent us an idea for helping understand nerve conduction.

My students catch onto continuous conduction in nerves when I have them stand in a line holding hands. I touch one of the ends and she/he raises her/his hand. As soon as one hand goes up, the other hand of the same person goes up and the first hand goes down. This continues down the line. In essence it is “The Wave” just like at ball games. Comparing continuous conduction to “The Wave” really helps my students. (After all, we are big Packers fans here!)

C. Appropriating the Proprioceptors

In addition to “The Wave,” Charlene (Lakeshore Technical College, Charlene.newby@gotoltc.edu) also gave us an idea for teaching about proprioceptors.

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Edu-Snippets - continued on page 16

HAPS-EDucator - Winter 2004 - page 15
Edu-Snippets - continued from page 15

One of the games I enjoy playing with friends is “Dictionary.” In this game, one person is “IT” and finds a word in the dictionary that no one in the group already knows. “IT” writes the true definition of the word, and all the players write a definition of their own. “IT” collects all the definitions (including the true one) and reads these definitions slowly to the entire group. At that time all players are asked to vote for their favorite definition. If they are right, they win one point. If anyone selects a player’s false definition, the one who wrote the definition also gets a point. The game is a lot of fun.

I have discovered that my students are often turned off by the medical terms that they should be learning. I decided to try a version of “Dictionary” with my classes to put an element of fun in the mastery of important medical terms. The game was modified for classroom conditions in the following way:

1. I divided the class into two teams and had the teams seated facing each other.
2. I went over the important prefixes, suffixes, and definitions in two chapters. I had prepared a list of these terms in advance, and cut them into individual strips of paper.
3. Each student blindly drew a strip bearing one of the important medical terms. Each student found the accurate definition for the term and wrote it down. Then the same student made up an inaccurate definition and wrote that down as well.
4. All texts were then closed and the game began. One student at a time would read the medical term aloud and provide either the correct or the incorrect definition. The opposite team had 30 seconds to decide if the term was correct or not. After the students were encouraged to confer with their teammates before stating their answer. If they had the right answer and it was “true,” they got one point. If they got the correct answer and it was “false,” not only did they get one point but they could get an extra point, if they came up with the “true” definition.
5. Then the opposite team took the field and presented the next term. Alternation of the teams allowed interests to remain high throughout the game. If the opposite team could not figure out the correct answer, the “IT” collected the definition.
6. The students loved the game and mentioned that they felt they learned the definitions better than with a lecture or even with a flash card approach.

III. Analogies Revisited

Some of the HAPSters may remember the analogies we used as a theme for our last EDU-Snippets column. Well, we have had a few more analogous contributions—so we thought we would include them here!

A. Woven Plywood

Terry Meehan (Chatham College, tjmeehan333@yahoo.com), who is no relation to either of the authors of this column, thought we would be interested in Chinese finger traps.

For the strength of the “woven plywood” of endomysium, perimysium, and epimysium into the periosteum (and bone via Sharpey’s fibers), I use a Chinese finger trap analogy. These finger traps are hard to find in toy stores, but I see them once in a while. I show the “Far Side” cartoon of the clothed skeleton with his fingers trapped in the Chinese handcuffs and pass around a finger trap for the students to play with (some have never seen one before!!). I then explain that the musculoskeletal system is encapsulated in a “continuous finger trap” or “woven Saran Wrap®” that makes the muscle anchoring system mighty strong—so strong that the muscles can snap the bone.

B. Opposing Muscles

David Evans (Penn College, Pennsylvania State University, devans@ptc.edu) had several muscular ideas for us.

When I explain muscle actions to students, I suggest, wherever possible, that they remember them in opposing movements. This helps down the line when they need to remember which muscles are antagonists to what. Everyone has heard of the pronate/supinate thing: supinate is making a soup-spoon out of your palm but your thumb moves in favor (pro-) to your midline. Here are two more! Inversion/eversion: in- for in but e- for exit. For abduction/adduction: you abduct or “kidnap” your arm.

C. Muscles Microscopically

David Parker (Broward College, Dparkerbio@aol.com) got us thinking about locks and keys!

Here’s a “quickie” analogy: Think of the actin-myosin-tropomin-tropomyosin complex as a lock. The tumblers (actin & myosin) are prohibited from turning because of the tropomin-tropomyosin inhibitors (internal lock parts). What releases the inhibition in a lock? Yes, the proper key inserted in the lock will release the inhibition. What is needed to release the inhibition of the actin-myosin-tropomin-tropomyosin complex? Yes, calcium. Calcium reacting with the muscle inhibitors releases this “hold” on the actin & myosin; therefore, they now can associate and the sliding commences, using energy. Of course in the case of a lock, now that the inhibition releases (lock is unlocked), you need energy to open turn the knob.

IV. AMATAP Revisited – And Assorted Academic Ascorbics

Some of the HAPSters may also remember the AMATAP column of about two years ago. Ken Saladin and Roberta Meehan wrote some mnemonics—actually AMATAP stands for “A Mnemonic Approach to Anatomy and Physiology.” Well, Mary Kay White (Brevard College, whitemk@brevard.edu) has come up with a few AMATAP and almost AMATAP ideas.

ENDOCRINE - For hormones from the anterior pituitary, the students use “My Favorite Guy/Gal Left Town After Partying” for MSH, FSH, GH, LH, TSH and PRL. For insulin, they use “in-cell-in” for the movement of glucose out of the blood, and “calci-bone-in” for the direction of calcium movement for calcitonin.

Edu-Snippets - continued on page 17
**Edu-Snippets - continued from page 16**

**SYSTEMS -** To name the 11 systems of the body, the students suggested “MUSCLE DINRR,” which, of course, is the best they could do with the spelling, considering the names of the systems.

**MUSCULAR -** To help remember the location of the insertion of the teres minor and major. I have the students create a “T” using their index and middle fingers of one hand (held horizontally) to represent the top bar of the T. These muscles are, like the fingers cylindrical (thus the teres part of the name), and one is larger than the other (with the minor located more superiorly). They then use the index finger of the opposite hand (held vertically) to come up and intersect between the other two fingers, creating the “T.” The vertical finger represents the long head of the triceps and all the muscles start with the letter “T.”

This association of the 3 T muscles, making a T, not only helps them remember the names, but also that the teres minor goes to the posterior humerus and laterally rotates it, while the teres major goes to the anterior humerus and medially rotates it. For that illustration, the students should make sure that the index finger representing the triceps splits the two teres muscles, forcing the smaller teres minor (index finger) to the back of the humerus, and the larger teres major (middle finger) to the front of the humerus.

For some of the other anterior muscles, we use the “lad between two majors” to remind them that the pectoralis major, and teres major insertions are separated by the latissimus dorsi.

**SKELETAL -** For the location of the cuboid, the students suggested, “he is a cute boy on the outside,” and for the talus, it is the “tallest” and on “top.” For the cranial bones, they suggested S.F. POET for the sphenoid, frontal, piaetal, occipital, ethmoid, and temporal. For the facial bones, “No More Zebras Visible In My Left Pocket” for the nasal, mandible, zygomatic, vomer, inferior nasal concha, maxilla, lacrimal, and palate bones. The bones with sinus cavities spell FEMS.

**TISSUES -** I use cotton vs. felt to demonstrate loose vs. dense connective tissue. I also use a stack of thin pretzels lined up in neat rows for dense regular connective tissue and have them thrown together haphazardly for dense irregular connective tissue.

**V. Points and Policies**

We also had a few other ideas that did not fit neatly into our categories.

**A. Quick Feedback**

Linda Banta (Sierra College, lbanta@sierracollege.edu) sent us an idea for fast and non-threatening feedback on newly presented ideas.

I periodically use one particular technique with information that is especially difficult to understand. After explaining the concept with examples and analogies, I ask for a show of hands with fingers raised—a closed fist if they are completely bewildered to 2 or 3 fingers for a partial understanding to an open hand if they have grasped the concept. This gives me quick feedback either to continue to another topic or to elucidate further. This also permits each student to express self-evaluation in a non-threatening way.

**B. Make-up Tests**

Augustine G. DiGiovanna (Salisbury University, agdigiovanna@salisbury.edu) has an idea for scheduling make-up tests.

I receive many requests for make-up tests because my A&P lecture sections often enroll more than 72 students and because I have a very liberal policy about what constitutes an acceptable excuse for missing a regular lecture test. I have reduced the number of requests and have been able to accommodate essentially all of the remaining requests conveniently by adopting a make-up day policy. Of course, the make-up day dates change each semester. I do not always require that students needing two make-up exams take them sequentially or on the same day.

Here is the policy. “Make-up exams will be given for serious reasons as judged by the instructor. For tests 1 and 2, make-up tests will be given on Monday, Oct. 27 during the regular class time. For tests 3-5, make-up tests will be given on Friday, Dec. 12 during the regular class time. You must present a satisfactory handwritten explanation for missing the regular exam prior to taking a make-up. The class presentation on make-up days will be recorded on audio-cassette and will be available to students who take a make-up exam. A grade of zero will be given for exams that are not taken or made up.”

As each make-up day approaches, I arrange for a colleague to proctor the make-up exams in an available room of the colleague’s choosing. That way, the colleague can work on whatever he or she desires while the students take the tests. If a proctor is not available, I ensure proper security by recording the make-up room using a video camera.

While students take the make-up exam, I use a portable cassette recorder to make an audio recording of the lecture I am giving for the rest of the students. I use our campus cassette copying machine in the foreign language labs to make additional copies of the tape. I loan the cassettes to students after they complete the make-up exams.

**VI. And We Hope You Will….**

Keep those cards and letters coming! We thank you all for your EDU-Snippet contributions. The next deadline is February 1, 2004, so we would like your contributions by January 20, 2004. Plan ahead—in case you will be gone for all or part of this next semester, you can submit your ideas now and maybe you too will see your EDU-Snippet in print!
HAPS E-Membership
Become an AAA HAPS Affiliate!

The new HAPS E-membership will help you add spark to your lesson plans and exams and keep you up to date with new developments in your field. Benefits include access to these AAA products and services:

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<td>• Book Reviews of Anatomy Textbooks and Publications</td>
</tr>
<tr>
<td>• Exam Question Database</td>
<td>• Program Details on the AAA Annual Meeting’s Education &amp; Teaching Track</td>
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<td>• Education Listserv</td>
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American Association of Anatomists
The annual process of identifying candidates for the 2004 HAPS election is underway. The Nominating Committee, which consists of Sandy Lewis (Chair), Jackie Butler, Tom Lancraft, and John Waters, will be assembling a slate of top candidates to fill each of the offices that have terms ending on July 1, 2004. These are President-Elect, Treasurer, Eastern Regional Director, and Western Regional Director. The following operating principles will guide the Nominating Committee in its work:

- A maximum of two candidates will be nominated for the position of President-Elect. This ensures that whoever is elected is supported by a majority of those members who vote. The maximum number of candidates for offices other than President-Elect has been set at three.
- Members of the Nominating Committee will solicit candidate recommendations from other HAPS members. You are invited to submit your own name to the Nominating Committee on or before January 31, 2004, in order to be considered for nomination.
- The Nominating Committee will compile a list of possible candidates for each office and prioritize the lists according to criteria approved by the HAPS Board of Directors. The criteria include the following:
  1) years of HAPS membership,
  2) committee participation and/or leadership,
  3) current or previous elected or appointed positions,
  4) attendance at regional and/or national conferences,
  5) presentations made at regional and/or national conferences,
  6) other special work for HAPS, and
  7) evidence of support from the home institution.
- After a list of potential candidates has been compiled and prioritized, each candidate will be approached individually to determine his or her willingness to run for a specific office.
- All discussions of potential candidates will remain confidential within the Nominating Committee.
- In late March or early April, each member of HAPS will receive brief biographies of the candidates along with ballots on which to indicate his or her choices. Write-in candidates are acceptable at the time of balloting. However, if you choose to enter a write-in vote for someone other than yourself, it is requested that you obtain the candidate’s approval before doing so. All ballots are to be submitted directly to OSG, HAPS headquarters in St. Louis, where HAPS management organization staff will count them. It will be my pleasure to announce the results of the election during the annual business meeting at the HAPS 2004 Conference in Calgary.

Description of the offices to be filled in the 2003 elections:

President-Elect: The office of President-Elect actually involves a three-year commitment (first as President-Elect, then President, and finally Past-President). The year-long training period of the President-Elect includes a position on the Board of Directors and ensures a smooth transition to the presidency the following year. The President-Elect works closely with the President and is privy to all of the decision-making and much of the correspondence in which the President engages. During the training year, the President-Elect is responsible for chairing the Nominating Committee for the next election.

Treasurer: The Treasurer is the chief fiscal officer of the Society. He/she oversees the receipt of all moneys paid to the Society as well as the deposit of all such moneys in a chartered bank in the name of the Society. He/she keeps a complete set of financial records for the Society and presents financial reports as required. Together with the Board of Directors, the Treasurer prepares the annual budget and oversees periodic accounting reviews. The Treasurer is a voting member of the Board of Directors and the Executive Committee and performs other duties as assigned by the President or the Board of Directors.

Regional Directors: The Regional Directors are elected by the entire membership and exist to ensure that there will be individuals from across the continent serving on the Board of Directors. Each Regional Director is responsible for communicating with his/her constituents via small group meetings and written communications. Regional Directors also serve as members of the Regional Conference Committee to promote local/regional conferences in their respective areas. In addition, Regional Directors are responsible for support and communication with various HAPS committees assigned to them. The term of office for this position is two years with the opportunity to be re-elected for one additional consecutive term. The positions up for election this year are the Eastern and Western Regional Directors.

Sandy Lewis
Chair, 2002-2003 Nominating Committee
Pierce College
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Puyallup, WA 98374
253-840-8377, 253-840-8388 fax
slewis@pierce.ctc.edu
October 11 was a bright, clear, warm day. Southern Maryland—and our target areas to the south, west, and north of us—were still recovering from Hurricane Isabel. Twenty registrants arrived early enough to enjoy a breakfast of bagels, muffins, fruit, and fruit juice. The caterer’s coffee was initially served from an insulated cardboard box, not the finest presentation, but, meanwhile the coffee urn was brewing more.

Welcoming comments by College of Southern Maryland President Elaine Ryan and greetings from Dean of Arts and Sciences Tim Keating launched the official proceedings. The keynote speaker, Mona Bayouth, who heads the BRAT (brain attack) team at the University of Maryland Hospital in Baltimore, addressed the theme of the conference: the computer/human interface in anatomy and physiology. She spoke about the effectiveness of the BRAT program, that uses computers to connect rural hospitals to specialists at the University Medical Center. Computers transmit technical information that allows the specialists to guide the rural hospital emergency team in administering the latest drugs that limit damage and enhance recovery without long delays or costly transport to the urban hospital 90 miles, (and too many hours away,) for many to survive with little lasting damage.

Workshops were offered before and after lunch. Most presenters and attendees enjoyed the intimacy of small groups as they discussed teaching A&P online, the new American Association of Anatomy website with online teaching tools, recording electro-oculograms with PowerLab, interactive problem solving using computers, or acupuncture as an alternative medical technique.

A hot lunch, including some of the best jambalaya ever, followed the morning workshops. During this break, Ronn Wade of the Maryland State Anatomy Board and the University of Maryland Medical School displayed some of his remarkable anatomical specimens. They were made using plastination and silicone injection. The sequential frontal sections of the human head were fascinating, (and beautiful,) and would be useful in the classroom.

The afternoon workshops which followed included sessions on teaching blood pressure by using Interactive Physiology, jump-starting your course, building group digital atlases, teaching tough topics, and a demonstration of a CD with lab specimens and models produced at the College of Southern Maryland.

The afternoon ended with a stimulating panel discussion of applications of A&P in healthcare professions. John Cody, who coordinates allied health programs at the College of Southern Maryland, skillfully facilitated the contributions of the panel, which included instructors in radiological technology, nursing, respiratory therapy, EMT, physical therapy assistant, message therapy, and physician assistant programs. The audience responded to the points made by the seven panelists with their own questions and comments. The panelists agreed that students often fail to retain what they learned in A&P or cannot make connections in the specific field of study. Critical thinking skills are lacking.

The day ended with a drawing for door prizes, which included gift certificates to national restaurant franchises, sweat shirts, hats, and other goodies. It was a good day filled with learning, sharing, and meeting interesting new people.

Regional Conference Committee Report

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Several regional conferences took place during 2003 and are planned for 2004. Some have not declared specific dates yet, but watch the HAPS web site (www.hapsweb.org) or contact the Regional Conference Committee for more information. Judith Osborn hosted a successful conference on 10/11/03 at the La Plata campus of College of Southern Maryland (see the report of this conference in this issue). Tom Lehman hosted a two-day conference on 11/8/03 & 11/9/03. Mike Timmons will be hosting a Midwest Regional conference on 2/28/04 at Moraiane Valley Community College. Geri Wright in Virginia is considering hosting a conference, though the date has not yet been set.

HAPS is trying to reach out to its members. Due to current economic constraints, people would like to have more conferences.
Committee Reports - continued from page 20

in their local areas. Some cannot attend the national conference, but would like to receive updates in their teaching field. Regional conferences provide an excellent opportunity to do that at low cost.

Please help your fellow HAPS members and other interested individuals by providing an easy access to HAPS conferences. Please consider hosting a regional conference in your area. The first step is to contact your administration to get its approval. Then set a date and select your committee. Please contact either your regional director or the chair of the regional Conference Committee for further information.

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H.A.P.S. Needs You

to host a regional conference

1. Low travel expense—draws people from a 250-mile radius, some of whom cannot attend the national conference
2. Low registration cost—often under $50 for registration & lunch
3. Convenience—usually held on weekends
4. Relevant topics & updates in your teaching field
5. Incentives—free registration at your conference and recognition of your peers

Contact: Regional Conference Chairperson (or your Regional Director)

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Proposal for a Regional Conference

Name of Conference Coordinator ______________________________

Coordinator’s Address  ___________________________________

____________________________________

Phone Number ___________________________________________

FAX Number ___________________________________________

Proposed Site/Host Institution _________________________________

Proposed Date(s) __________________________________________

Please supply the following information on separate sheets of paper:

• 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 state(s) for areas to be included in mailings (usually not more than a 250-mile radius)
• Outline of Proposed Budget (see Budget section of Guide for Coordinators of HAPS Local Conferences) to be turned in within 2 months prior to conference
It seems like it was just yesterday (although it was eight years ago), that I was interviewing for the faculty position to teach Human Anatomy and Physiology. Our campus President asked “Why are you not at a four-year college? Why do you want to teach at the Community College?” My answer to him was that I wanted to bring research experience to Community College students, something that has come true today; we are about to publish our first research effort.

Undergraduate research is part of the curriculum in most four-year colleges today. But why just universities and four-year colleges? There are programs nationwide engaging high school students in research with brilliant outcomes. Yet most high school graduates who will enroll in the community college have had few opportunities or exposure to research. My experiment of offering research at St. Louis Community College was well supported by the department and the College with lab space and some funds to equip the lab. A course called Research Techniques in Biology was designed and the Institutional Animal Care and Use Committee was set up. A maximum of six students are allowed in this course, as the training requires close observation and interaction. I applied for a HAPS grant in February 2002 and was successful in receiving $1,500.00 towards teaching this class for two semesters.

Research techniques taught in this course include size exclusion chromatography, introduction to UV spectrophotometer using methemoglobin and oxyhemoglobin, High Performance Liquid Chromatography with an Electrochemical Detector, the in vitro perfusion technique of collecting neurotransmitters from the brain sample, and histology work including slicing of frozen brain sections using a freeze microtome and isolating selected brain regions through the micropunch technique. Animal work included caring and handling of rats, maintaining estrous cycle records, ovariectomy and hormone replacement in female rats, and castration in male rats. To teach stereotaxic technique of implanting a cannula in the brain ventricle, we needed an injectable anesthetic that would keep the animal anesthetized for 15-20 minutes. Most of the injectable anesthetics are regulated by Drug Enforcement Administration (DEA) and, since we did not have a DEA license, we were unable to use an effective injectable anesthetic. Avertin is an injectable anesthetic that is not controlled by the DEA and is commonly used in embryo transfer experiments in mice. This anesthetic has to be freshly prepared in the lab before use. In our studies, Avertin anesthetized the rat for an average of 10 minutes. In search of a longer acting anesthetic, we tried a combination of Avertin and an analgesic and have obtained very promising results, which will be presented at the HAPS Annual Conference in June 2004.

Students in this course are allowed to design projects based on the training in the various techniques they learn in the class. Students are taught to analyze the data using Excel and are expected to present their work to their classmates and to the Biology Faculty using a Power Point presentation. Students are trained to search for scientific articles and extract information from them. They are also trained to write research papers.

This course is designed for students at the sophomore level who have completed courses in basic chemistry, math, biology, and English. Most of the students who have been enrolled in this course are either students from St. Louis Community College’s Biotechnology program, or are from other colleges and industries that are looking for opportunities to expand their chances of learning research techniques to secure a position in industry or graduate school. Some of the students already completed undergraduate have degrees. The student graduating from the St. Louis Community College’s Biotechnology program may use this course as an internship.

We have established collaboration between our lab and Washington University School of Medicine. Dr. Mike Talcott, the director of the Veterinary Division at Washington University School of Medicine, is a member of our Institutional Animal Care and Use Committee and is supporting the research work involving anesthetics.

Once the anesthetic work is completed, I would like to pursue research studying the role of the hormone estrogen in regulating memory. It is easier if a project from A&P I is ongoing into A&P II so that the students can start the semester learning not only the techniques but also sample real research.

With the ongoing reductions in state funding, securing funds to meet the cost of the Research Techniques course work remains a challenge. I owe much gratitude to HAPS for providing support in this endeavor. I am also grateful to Charles River Labs, CA, for providing rats free of charge in order to promote research at our institution. Balancing research along with a full load of teaching and seeking grants demands time. The reward for persistence in introducing research to community college students is the progress we have made in this direction, and there is much more to come.

The above article is submitted in partial fulfillment of the commitment to HAPS after receiving the 2002 Faculty Grant awarded at the Phoenix Arizona Annual Meeting. Remember, you too can apply for grant funds. See the HAPS website at www.haps.org, click on Grants and Scholarships. Note that the deadlines for grants and scholarships are different. Any questions? Contact Richard Faircloth at rfaircloth@aacc.edu or (410) 777-2272.
While sequencing the human genome was, and is, a major scientific undertaking, it is truly “the end of the beginning”—a jumping-off point for all of genetics and for all of science, in general. Knowing one’s genome sequence facilitates comparing the DNA sequence of someone who is free of a certain disease with that of someone who has that disease. Knowing this, elegant technologies like gene therapy may offer cures for that disease at a level that obviates the use of drugs, surgery, etc. Ironically, knowing these sequences has stimulated major drug companies to divert their efforts from treating the symptoms of a disease, to treating the genetic cause. Dr. Nussbaum’s opinion is that ongoing research in linkage disequilibrium and haplotype mapping is certainly one of the most significant areas of research that will utilize genome project information for the benefit of humanity.

I admit to having the ability to listen to a talk in my area of expertise, while at the same time summing up in my mind how the audience surrounding me is reacting to it. Yes, it requires the same kind of coordination as walking, chewing gum, and talking on the cell phone simultaneously—with a little practice, one can master it! It became very clear to me that the first part of the talk, summarizing the genome project, was a learning experience for all of us. In the next part of the talk, however, when Dr. Nussbaum discussed linkage disequilibrium, LOD score calculations, and “hap-mapping,” it was obvious that many of the listeners did not have the background needed to comprehend these advanced genetic concepts. Nor did Dr. Nussbaum fill in the background necessary. So, I would like to supply the background that would have increased HAPSters understanding.

The Basics—Single Nucleotide Polymorphisms

As we know, the only difference between normal and disease phenotypes is quite often a change (mutation) in a single nucleotide. Such a change has classically been called a point mutation, but there is a newer term. Polymorphism, as we know, means variation in structure. If a change in one nucleotide causes a disease, the difference between disease and non-disease is termed a single nucleotide polymorphism, or SNP. “Snips,” as they are called, are quite easy to detect, and with the human genome project, finding them is becoming even easier than it has been.

Many lab techniques exist to detect SNP’s. Southern blotting, PCR, gene chips, and others are all terms you may have heard and are all tried and true methods for accurately detecting SNP’s.

As a result, easily accessible web databases exist that catalogue literally millions of human SNP’s. However, to stick to the theme of Dr. Nussbaum’s talk, we will not go into these techniques at this time, but rather will simply clarify two of his major points: (1) haplotype mapping and (2) linkage disequilibrium. Then, I will explain why these two areas are such hot topics in genetics.

What is a haplotype?

Placing a gene somewhere on a chromosome is, by today’s standards, very easy to do. Many times, though, the product of that gene is very hard to detect, and the gene itself, for many reasons, may be very hard to precisely position on that chromosome. However, those genes often have close neighbors that are easier to map and/or whose product is much easier to find. If the neighbor can be mapped, there is a strong statistical possibility that the gene itself has also been mapped. Such neighborhood genes are called markers. Depending on how close the marker is to the gene of interest, the two may or may not be separated during prophase I of meiosis. The closer they are, the less likely they are to be separated. If the marker and the gene do wind up on different homologues, they are said to be in the repulsion phase or trans position. If they remain on the same chromosome after meiosis I, they are said to be in the coupling phase or cis position. A disease gene and its marker, when on the same chromosome (coupling phase), constitute a simple haplotype. In reality, the gene of interest is probably linked to many markers in the neighborhood. So, the accurate definition of a haplotype is a gene and all of its linked markers on a single chromosome. Why the term HAPLO-type? We know that haplo means half. And, in fact, the term applies to one member of each pair of chromosomes. This offers a very significant research advantage in that only one chromosome is studied, instead of both members of the homologous pair.

What is linkage disequilibrium? (aka . . . get a LOD of this)

It is useful to know whether two genes of interest, or one gene and a detectable marker, are linked (on the same chromosome) or not. If they are linked, how far apart are the genes from each other? Knowing the location of the genes will give us an idea of how (or if) the genes will segregate from one generation to the next. With a large enough sample size, data can be collected
on segregation to determine whether or not the genes are linked. A statistic called a log of all the odds (LOD) score is used to make this determination.

Here is a hypothetical scenario: two diseases running in the same family are caused by a change of dominant “P” to recessive “p” and by a change of dominant “T” to recessive “t.” Each change is caused by a SNP. In other words, the SNP is the difference between the dominant alleles (“P” and “T”) and their recessive alternatives (“p” and “t”) by two. Analyzing several generations of a large family with both diseases, one can estimate recombination frequency using very classic Mendelian genetics. For example, if two parents are heterozygous for genes, you would expect a classic 9:3:3:1 ratio among their offspring if the genes are on different chromosomes. Significant deviation from 9:3:3:1 suggests that the genes are linked. So, a LOD score is calculated by making two estimations from either empirical or family data:

\[
P1 = \text{The probability that the observed results would be obtained if the genes are linked.}
\]
\[
P2 = \text{The probability that the observed results would be obtained if the genes were not linked.}
\]

Take the ratio of P1 to P2 and express it as a log number. Without going into the gross math (and the math is REALLY gross), assume, for example, the ratio is 1,000 to 1 \((10^3)\). The log of the odds (the log of 10^3) is 3. So, the LOD score is 3. It follows that a LOD score of 4 is obtained if the ratio is 10,000 to 1, 100,000 to 1 gives a LOD score of 5, etc.

So why all the fuss?
Before we answer, “why all the fuss?” be sure you understand this next statement. If not, go back and review!!!

If SNP variations and their markers all occur in a haplotype, then they will show linkage disequilibrium verified by a LOD score of 3 or higher. If this is the case, we know that this probably has been the case for many generations, and it will allow us to predict the outcome of future generations. Haplotype mapping of the human genome has shown literally thousands of places where different SNP’s and clusters of SNP’s show linkage disequilibrium verified by high LOD scores. In fact, databases are being developed that will have hap-maps for every one of the human chromosomes, including the X and the Y. And remember that we must deal with only one member of each chromosome pair instead of both of them!!!

Knowing this information and coupling it with the knowledge of the actual DNA sequence, we can more efficiently (1) predict the occurrence of one or more diseases in future generations, (2) develop gene therapy procedures to deal with these outcomes, (3) allow gene targeting by DNA-based pharmaceuticals, and (4) perhaps give us, at least, an embryonic start on treating some of the polygenic conditions, like heart disease, cancer, personality disorders, etc.

HAPS members owe the conference organizers a special “thank you” for engaging a scientist of Dr. Nussbaum’s reputation and genetics expertise to present the keynote address. As a geneticist myself, I appreciated listening to Dr. Nussbaum’s elegant summary of the implications of the human genome project.

Review of Workshop #104
Anatomy and Physiology On-Line: A First Time Experience

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This workshop gave participants some fundamental guidelines and tips for designing an on-line Anatomy and Physiology lecture using a Blackboard platform. The material shown included a series of interactive lectures that allows students to test themselves on material as they read it on a computer. The lectures are created in Word, using a hyperlink feature that enables an instructor to pose a question within the lecture and students to click on the answer and have the answer come up on the screen. The lectures also contain embedded photographs from the textbook.

An example of a part of an interactive lecture is shown below. After students fill in the chart and answer the question, they click on Answer 8. This takes them to the answer at the bottom of the document. After they read the answer, they click on radioactivity. This takes them back to the place in the text were they left off.

ISOTOPES

Different forms of the same element which have:

- The same number of protons
- A different number of neutrons

Examine an atom of hydrogen in Tortora, figure 2.2 page 29 and use it to calculate the following three forms of hydrogen.
How do the atomic numbers and mass numbers compare for an atom and its isotopes?  
Click here ANSWER 8 to get the answer

**ANSWER 8**

calculate the following

<table>
<thead>
<tr>
<th>ATOMIC NUMBER</th>
<th>MASS NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROGEN</td>
<td>1</td>
</tr>
<tr>
<td>DEUTERIUM</td>
<td>2</td>
</tr>
<tr>
<td>TRITIUM</td>
<td>3</td>
</tr>
</tbody>
</table>

The presentation placed emphasis on providing students with important information at the outset of the course, such as how quickly an instructor will return papers and respond to email and student email etiquette. Thus, for example, in the first announcement of the course, the following paragraph is included:  
“I will check my phone and email messages Monday through Friday. I will notify you when I get your assignments to let you know that they have arrived, but I will not grade them immediately. It will take up to 7 days for me to grade assignments. Exams will be graded within 5 days.”

This statement ensures that students have realistic expectations and are not emailing the day after the exam to get their grades.

On-line testing was presented as a labor-intensive question entry process and one for which there were no guarantees that students were not cheating. As an alternative, the course requires students to come to campus and take the exam in the testing center. They can take the exam at a time of their choosing during the week of the exam.

Participants at the session were shown how students can use the digital drop box and discussion board to turn in weekly worksheet assignments and responses to discussion questions. They were also given the opportunity to explore the Anatomy and Physiology course on-line website.

It was explained that the overall success of this course is dependent on the motivation of the students. The on-line course works very well for self-motivated students with a decent understanding of introductory biology, but does not work well for students who select the course because it is the only section that is available.
Review of Workshop #305
Energy Balance: What We Can (but Perhaps, Should Not, and the Textbooks Don’t) Teach Our Students

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In most A&P textbooks, there is a chapter devoted to metabolism (the dreaded chapter 25). This chapter devotes a significant portion of the text to the description of cellular metabolic pathways: glycolysis and the citric acid cycle. I presented an alternative content for this chapter—whole body energy balance and its hormonal regulation. Foods that we eat contain energy: carbohydrates (4 Kcal/g), protein (4Kcal/g), and fat (9 Kcal/g). When energy intake from food equals energy expenditure (i.e. resting metabolic rate, cost of digestion, and physical activity), we are in energy balance and body mass is maintained. Conversely if energy input is greater than output, we are in positive energy balance and we gain body mass, and when energy output is greater than energy intake, we are in negative energy balance and we lose body mass.

In the past 10 years, a new picture of the regulation of energy intake emerged. In 1996, leptin, a hormone produced by adipose tissue, was first described. Leptin signals adiposity and, therefore, serves as a lipostatic signal. In normal individuals increased adiposity causes an increase in leptin circulating levels. Leptin binds to its hypothalamic receptor and causes a decrease in the secretion of NYP, one of the most potent hunger brain neurotransmitters and, therefore, a decrease in food intake. In addition, leptin also stimulates energy expenditure mechanisms. Animal models that have a genetic mutation preventing their adipose tissue from secreting leptin (ob/ob mouse) or a defect in their leptin brain receptor (db/db mouse) are obese. Unfortunately these genetic defects do not appear to be a major cause of human obesity. Leptin assess fat storage, therefore is a long-range modulator of energy intake. Ghrelin is produced by the stomach and seems to modulate the short-term energy reserves. Its level rises throughout the period prior to feeding and drops immediately after a meal, indicating a short-range modulation of energy intake.

It appears that the energy intake is regulated long term (leptin) and a short-term modulator (ghrelin) that work together.

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It appears that the energy intake is regulated long term (leptin) and a short-term modulator (ghrelin) that work together.
A mentor is a trusted counselor, or guide, tutor or coach. With this definition in mind, West Virginia University at Parkersburg decided to use female science students as mentors to direct activities for younger junior high or high school students, and, occasionally, for elementary school scholars. Mentors have been used in a number of different situations, particularly those involving a substantial age gap between the students and the professors.

1. After School Research Projects
When West Virginia University at Parkersburg received an NSF grant on Gender Equity, we wanted to involve high school girls in hands-on data collection and interpretation. In fieldwork experiments, our mentors were paid by the grant to go into the field with the students to collect data. Three female faculty members also went on the collecting trips and were expected to do the same work that was done by the students.

2. Special Career Day Trips
In order to encourage female high school students to continue in the harder upper division science and math classes, we hosted a trip to West Virginia University’s very modern Crime Room for the new forensics program. The program director talked about the types of science classes, the kind of grades, and the moral standards required to get into this very competitive field. The Law School Dean spoke about admission requirements for the Law School. The group then visited a hospital to receive information about becoming Medical Examiners and about becoming specialists in several different areas of nursing. The trip also included visits to the Neo-natal and Pediatric Intensive Care departments. The mentors merely accompanied the teens and were considered to be part of the group.

3. Special Days at the College
When special days occur on campus, we have found that younger students (preteens) love to do experiments that the regular college students do. Two highly successful and repeatedly requested experiments are Dinosaur Bones and Dissection of the Sheep Brain. Our college has had excellent results with allowing college students to use these experiments to work with children. The undergraduates like it and the kids love to see the type of activities done in college. These “special days” also become a subtle recruitment tool. Our college wants young people to feel comfortable in the campus environment and this non-threatening, no testing method works very well.

Some of the elementary students have come for 3 or 4 years and still request the “Brain.” Our mentors say “the grosser, the better” when selecting these activities. We let the college students show some autopsy slides of stroke and brain cancer. We also include a collection of X-rays from many different clinical situations. The elementary students seem to love these and much discussion is generated. The college student mentors are graded for the service component in some of their classes.

4. Summer Science Camps
As part of our Gender Equity Grant, we hosted a weeklong summer camp emphasizing the sciences, with the college student mentors being from the areas of Geology and Physical Science, Anatomy, and Physiology. We had 28 female high school students divided into three groups, with the girls rotating through three exercises per day. Each mentor selected five topics in her area of expertise; professors served as tutors to prepare the mentors. Each mentor was asked to include some mathematical calculations applying to the area under consideration. For example, in Geology, the teens collected data on weight and volumes; then calculated the densities of certain minerals. Each mentor was also instructed to be specific about the science classes required for certain careers and to discuss these science classes with enthusiasm.

In order to involve everyone, the Physiology mentor had the students perform urinalyses for common urinary components. The students then analyzed four abnormal urine samples. This experiment led to a discussion about the use of scientific testing, diagnosing diseases, and the importance of good scientific technique. In this way, an application could be seen between science classes and certain science oriented careers. Professors first prepared the mentors and then took over and directed the entire summer camp.

The university’s lab technician was available to help with supplies and equipment at all times. The mentors, the high school teachers (who visited and were not a part of the program), and the high school students all reported that summer camp constituted a very successful week.
The following committee chairs invite input from HAPS members and willingly provide information on the activities of their committees.

**ANNUAL CONFERENCE COMMITTEE**

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

**CORE CURRICULUM AND ASSESSMENT COMMITTEE**

Murray Jensen, Chair  
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University of Minnesota  
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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.

**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.

**MARKETING COMMITTEE**

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The marketing committee promotes HAPS and its functions as the liaison between HAPS and A&P vendors.

**MEMBERSHIP DEVELOPMENT 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 committee is responsible for recruiting nominees for the elected offices and appointed positions of the HAPS organization.

**PRESIDENTS EMERITI ADVISORY BOARD**

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Liaison Life Science Department  
Mohawk Valley Community College  
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Utica, NY 13501  
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(330) 792-5556 fax

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

**HAPS-EDUCATOR ADVISORY PANEL**

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Members of the HAPS-Educator Advisory Panel provide advisory and support services to the HAPS-Educator editor such as soliciting and reviewing articles, and proofreading the final draft of the HAPS-Educator before it goes to press.

**HAPS WEB PAGE**

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**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.

**AD HOC COMMITTEES**

**ANIMAL USE COMMITTEE**

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

**CADAVER USE COMMITTEE**

Christine Ekel, Chair  
Department of Biology/Natural Science & Communication  
Salt Lake Community College  
Salt Lake City, UT 84130-0808  
(801) 957-4640  
(801) 957-4821 fax  
Christine.illet@slcc.edu

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

**SAFETY COMMITTEE**

Karen McMahon, Chair  
Biological Science  
University of Tulsa  
600 S. College Ave.  
Tulsa, OK 74104  
(918) 631-3129  
(918) 631-2762 fax  
karen-mcmahon@utulsa.edu

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

**TECHNOLOGY COMMITTEE**

Dayton Ford, Chair  
Biology/Pharmaceutical Sciences  
St. Louis College of Pharmacy  
4588 Parkview Place  
St. Louis, MO 63110  
(314) 367-8700  
dford@stlcop.edu

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

**TESTING COMMITTEE**

Janis Thompson, Chair  
Math and Science  
Lorain County Community College  
1005 North Abbe Road  
Elyria, OH 44035  
(440) 366-7245  
(440) 366-4342 fax  
jthompson@lorainccc.edu

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

**CONFERENCE COORDINATORS**

2004 in Calgary, Alberta, Canada

Izak Paul, Coordinator  
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Margaret Week, Coordinator  
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