Teaching Science as a Process in the Anatomy and Physiology Laboratory

by David S. Smith,
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A major problem that teachers of anatomy and physiology face is finding a way to ensure that our students understand science as a process of discovery. I think that most of us would agree that in science, "how we know" is just as important as "what we know." However, faced with ever increasing amounts of factual material that students must learn, we find it difficult to spend much time teaching science as a method of discovery. One approach is to incorporate scientific investigation into traditional laboratory exercises. This permits students to become participants in the process of discovery. Here's one idea for an exercise physiology/cardiovascular system lab.

Students measure their heart rate (pulse) and blood pressure before and after a prescribed exercise regimen. The exercise may consist of jogging on a treadmill, riding a stationary bike, bench stepping, or running in place for a given time. The only criteria are that the exercise should be relatively standard for all students and should be sufficiently strenuous to substantially raise the pulse rate.

Data are taken every thirty seconds until the values have returned to pre-exercise levels. This time period is recorded as the "recovery" time on a form that also provides spaces for resting and post-exercise values of heart rate and blood pressure. In addition, the form calls for other data including, age, sex, height, weight, whether or not they smoke, and whether or not they participate in a regular exercise program (defined as 30 minutes minimum for at least three days each week). I consolidate the completed forms into a single data sheet.

At the next laboratory period the students receive a copy of the data sheet along with an instruction sheet for the project. The instruction sheet briefly discusses science as a process, hypothesis formation, deduction, and induction. Students are instructed to analyze the data and draw some conclusions. They are given free rein as to what data should be analyzed and how it should be analyzed. I provide a few possibilities as a starting point, for example, comparing recovery time between exercisers and non-exercisers, average heart rates of males versus females, and so on. However, I feel it is important that the students should not feel constrained to one or two approaches. The instructions also include some elementary statistical techniques (mean, standard deviation, T-tests, and correlation coefficient) plus some hints on presentation of results in graphs and/or tables. A written report is required and a laboratory period is set aside for a discussion of the reports and their conclusions. It is emphasized to the students that what they are doing is what working scientists do on a daily basis, trying to discern patterns and principles from a myriad of facts.

[continued on page 3]
1992 Conference - June 6-11

Planning for the 1992 HAPS Conference is well underway. Conference registration packets will be sent out in mid-March to those who returned cards requesting further information. If you have not returned the card because it's lost amid a sea of papers in your office, a regular postcard will do. Send it to Shirley Mulcahy at the address given below. Include your name, address, institution and department, and office and home phone numbers.

Topics presently on the agenda for Update Symposia include: Problems in the Reproduction of Endangered Species, Reconstructing Behavior from the Skeleton, Muscle and Skeletal Sports Injuries, Membrane Physiology, Organ Transplants, Respiratory Physiology, and Some Ideas About the Teaching of Science. Just some of the workshops being planned are Production and/or Use of Videodiscs, Multimedia Laboratories, IBM Advanced Academic Systems, A.D.A.M Software, Helpful Hints for New Instructors, Student Diagnosis: Word Learners vs. Picture Learners, Use of "Active" Learning during Physiology Lecture, Use of Animals in A&P Courses, and Critical Thinking. Tours of UCSD Medical Center, the San Diego Police Crime Lab, and other local spots of interest are also being organized. Each attendee will be able to schedule up to 12 hours of Workshops and tours.

Tentative Schedule

Sat. June 6    Registration and welcoming reception (poolside)
Sun. June 7    HAPS business meeting
Mon. June 8    Update Symposia at Hanalei Hotel; Exhibits
               Update Symposia at Hanalei Hotel; Exhibits
               HAPS Banquet ($24)
Tues. June 9   Workshops at San Diego Mesa College
               Old Globe Theater "A...my name is still Alice" ($23; 8pm)
               Optional tour of San Diego Zoo ($24; 2-5pm)
Wed. June 10   Workshops at San Diego Mesa College (am);
               Optional tour of Wild Animal Park ($28; 2-5pm)
Thurs. June 11  Workshops at Mesa (am); conference ends at noon
               Optional tour of Wild Animal Park ($17)
Fri. June 12   Optional tour of Sea World ($17)

-- Shirley A. Mulcahy
1992 Conference Coordinator
San Diego Mesa College, Biology Department
7250 Mesa College Drive, San Diego, CA 92111
Phone (619) 627-2787; FAX (619) 279-5668

Registration: HAPS members, registration fee for the week is $150; for non-members, registration is $200. Registration for the seminar sessions only on Sunday and Monday or for the Workshops on Tuesday through Thursday will be $90 for members and $110 for non-members.

Hotel: Rooms at the Hanalei Hotel will be $72 single or double occupancy per day, and these rates will be extended 3 days before and after the conference dates. Reservations can be made by calling 1-800-854-2608 (in California 1-800-524-6082).

Airline: The official airline for the HAPS Conference is American Airlines. Call 1-800-433-1790 for full details and ask for STAR file #016V3.

Car rental: Reservations for special-rate Hertz rental cars may be made by calling 1-800-654-2240 and asking for CV#3375.
Science As a Process

Continued from page 1

I have tried this approach with each student working on their own, and also as a group project with four students to a group. When students work in groups, the dynamics of the group interactions seem to result in more creative approaches. Also the initial resistance is less since a group approach is perceived as requiring less work on their part.

Initially many students see the assignment as simply another burden, but once they get involved, they get very excited. This shows up in the reports which are often extremely detailed and thorough. Not uncommonly, the reports contain suggestions of other kinds of data that could be gathered when the project is done again. Students find the idea of working with a unique set of data derived exclusively from themselves to be very satisfying. Many have admitted that is was not until this project that they fully understood what textbook values for average heart rates and blood pressures really represented. Others have told me that they began exercising or gave up smoking after having completed this project!

In summary, I have found this approach to be much more effective in teaching science as a process than the traditional laboratory report. It forces students to think critically and creatively, and gives them a far greater appreciation for what went into those "facts" they find in their textbooks.

[Editor's note: David would be happy to supply copies of his project instructions to interested instructors to the extent that his printing budget allows.]

HAPS News is published four times a year by the Human Anatomy and Physiology Society (HAPS). Papers for publication, requests for information, positions available and wanted, and letters to the editor are welcomed. Send a double-spaced typed or printed copy together with your name, position, address, phone number, and school affiliation to the Editor. HAPS News is created in Microsoft Word on a Macintosh computer. Your editor appreciates receiving files on 3.5" microdisks or 5.25" double density PC disks. Please identify your software and hardware.

A Gift

I can't put you out of my mind. Why did you give yourself to me? A gift to a stranger.

Who were you? What was your name? Where are you from? Too many questions not to be asked no answers only work to be done.

Unselfish donation Skinned of all dignity No longer somebody's mother wife or daughter, but my tool.

Butcher or Scholar? Exploration and discovery for knowledge all in the name of science I'm sorry.

Dehumanized I don't want to separate person from specimen utmost respect.

No longer the scent of expensive perfume. Formaldehyde is now your bouquet.

Neatly manicured nails. Were you an artist?

Stubble now crowns your head. Did you have long locks?

Such a big heart, Who did you love?

From the womb to a body bag Your new home a freezer The miracle of life a gift to me.

Thank you.

by Charise Smith Human Anatomy student (1990-91) at Heidelberg College, Tiffin, Ohio
The constitution of HAPS directs the nominating committee to prepare an annual ballot of nominees for elected positions within the Society, with the president-elect (Gary Johnson of Madison Area Technical College) serving as chair of the committee and three other members being appointed by the president and approved by the Executive Committee. This year's committee consists of Felecia Harvey of Eastern New Mexico University, Eloise Renwand of Providence Hospital of Nursing in Ohio, and Glenn Yoshida of Los Angeles Southwest College.

The Nominating Committee is now soliciting nominations for officers, for newsletter editor, and for appointed committee members from the membership. If you are willing to serve as an officer, newsletter editor, or committee member, or if someone contacts you and asks you to be a candidate, please fill out the enclosed form and return it to Gary Johnson by March 30. If you know of members who would be good candidates, please encourage them to submit their names.

The new President-elect will serve a three-year term (President in '93-'94 and Past-president in '94-'95). New members-at-large on the Executive Board will serve for two years ('92-'94). Other officers and committee members elected and selected this year will serve from June 1992 to June 1993.

The Constitution stipulates that the Nominating Committee submit a slate of officers with a minimum of two candidates per office to the membership at least one month before the annual meeting. We will present the candidates in the May issue of HAPS News. The ballots can be returned to the Nominating Committee or placed in the Ballot Box at the annual meeting in San Diego. Results will be announced during the annual meeting.

During the 1992 HAPS meeting in San Diego, the Core Curriculum Committee will conduct Workshops to present their proposed Core Curriculum for Anatomy and Physiology. Headed by Vic Johnson of Madison Area Technical College, the committee is refining a model curriculum based on input received from several members of this interest group.

At the Workshops in June, suggestions will be solicited from interested HAPS members, with the goal of establishing a HAPS-endorsed Core Curriculum. Future efforts will also be directed toward developing HAPS-endorsed pre- and/or post-tests for Anatomy and Physiology. For more information or to provide input, contact:

Vic Johnson
Madison Area Technical College
3850 Anderson Street
Madison, WI 53704-2599

HUMAN ANATOMY INSTRUCTOR (non-tenure track). Candidates should have experience in human anatomy and preferably a Ph.D., but applicants with a master's degree and appropriate experience will be considered. Responsibilities will include teaching human anatomy and supervision of associated laboratories. Preference will be given to applicants who have experience with cadaveric dissection. Review of applications will begin 1 June 1992 and continue until position is filled. Desired starting date is 1 September 1992 (negotiable). Applicants should submit a curriculum vitae, names of three references, and a brief statement of teaching competency.

Forward application materials to:
Dr. Daniel D. Jones, Chair
Department of Biology
University of Alabama at Birmingham, UAB Station
Birmingham, AL 35294-1170.

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Lecture Ideas

WRITING TO LEARN

from Linda S. Kollett, Ph.D., Massasoit Community College, Brockton, MA 02402

Several years ago, I realized that many of the students in my Human Anatomy and Physiology course were very adept at listing symptoms of various diseases and abnormal conditions, but it was not clear that they were connecting clinical experiences to their knowledge of normal structure and function of the body. At about the same time, the Writing Across the Curriculum (WAC) program at Massasoit Community College was taking shape. This convenient coincidence provided the opportunity to develop a writing exercise for my students that would take advantage of the resources provided by Massasoit's WAC program.

For several semesters now, English Department Professor Joan Baker and I have been working with Anatomy and Physiology students on a short, research-based writing project. The students select a disease or abnormal condition that interests them and research the disorder by consulting their text and at least two recent sources. Then, they write a two-to three-page paper, that explains briefly and clearly to a non-clinical audience the following: the normal condition of the system or organ affected by the disease; the overt symptoms of the disease; and most importantly, the anatomical and/or physiological changes to the organ or system that cause the described symptoms. A brief section on available treatment is optional as part of a summary statement.

Although the assignment is intentionally kept short, it still serves several important purposes. (1) It introduces students to the conventions of scientific documentation with which they are not usually familiar. (2) It allows them to become mini-experts on a disease or abnormal condition about which they have a special interest. (3) It encourages thinking about the underlying anatomical and physiological causes of overt symptoms. (4) It helps students develop the skills needed for explaining complex clinical problems in a way easily understood by non-clinical audiences.

Students are coached and supported in various ways as they complete this assignment. First, I provide a detailed, written explanation of the assignment, outlining the major areas that the paper should address and giving examples of scientific documentation, including citation and reference formats. Also, I give students copies of the twelve-item checklist that I will use to grade the final draft of their papers. Professor Baker conducts a workshop for interested students during which she answers questions they may have about the assignment and offers suggestions about the actual process of writing the paper. Next, I ask students to submit a typed, working draft of their papers. I read the drafts, making suggestions for improvement, and return them to the students. The papers, worth 5% of the course grade, are evaluated on both form and content and are returned to students with comments by the end of the semester.

Most students enjoy the assignment, and some have said that they would never again be satisfied with superficial explanations of biological phenomena. It provides an important opportunity to think clearly and communicate carefully about complex clinical problems.

ELECTRON TRANSPORT SYSTEM DEMO

from John Pasto
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Middle Georgia College
1100 Second Street SE
Cochran, GA 31014-1599

After discussing oxidation-reduction reactions, cytochromes are used as examples of compounds that are oxidized and reduced by giving and taking electrons. The cytochromes are fixed to membranes to form the electron transport system, the main ATP generator in cells. When a series of cytochromes being oxidized and reduced is listed on the board, little understanding results.

At this point the students in the first row are told that they are cytochromes fixed to the inner mitochondrial membrane. The first student (the first "cytochrome") is given two softballs marked with an e- and is asked: "Has this cytochrome been oxidized or reduced?" The first student immediately passes the softballs to the next and the question is repeated, this time to both students. When the softballs reach the last cytochrome the question "what happens if the
last cytochrome cannot give up its electrons?" is asked. Students usually guess that the entire chain stops, ATP generation stops and the cell dies. Using this simple demonstration the role of oxygen as the final electron acceptor and reduced coenzymes as the source of electrons is discussed.

All of this takes 5 to 10 minutes; it simply and clearly demonstrates the role of oxidation and reduction in the electron transport system.

**Lab Idea**

**USDA'S DIETARY ANALYSIS PROGRAM FOR THE PERSONAL COMPUTER**

from Mildred Galler
Cochise College
Rt. 1, Box 100
Douglas, AZ 85607

I cover nutrients and nutrition in a standard lecture setting. In the lab on digestion, students perform simple tests for carbohydrates, proteins, amino acids and fats. In the past, this activity never seemed to make much impact, however. Now, as part of their lab requirements, students keep a food intake diary for 1 to 3 days. They then use the USDA's Dietary Analysis Program to analyze their own diet.

The program is set up on the computers and is available outside of regular class times. Most students not only run the required analysis but return many times to analyze diets for family and friends. Since the program also makes suggestions for improvements, some students have changed their eating habits to improve their nutrition. The following information is from the documentation that comes on disk with the program.

USDA's Dietary Analysis Program (DAP) is a user-friendly software package developed by Human Nutrition Information Service in cooperation with the Extension System for use with consumers. The program performs dietary analysis for 28 nutrients and food components using up to 3 days of reported food intakes. A menu-entry approach can be used to enter food for analysis.

Standard output produced by the dietary analysis program consists of a complete list of the foods and quantities reported; bar graphs showing percentage of user's RDA for fifteen nutrients; percentage of calories from protein, carbohydrate, fats, saturated fatty acids, and alcohol; and dietary totals for selected nutrients and components. Handout materials accompany the program to help users interpret results of the dietary analysis.

**Objectives**

1. To provide a relatively quick and easy-to-use nutritional analysis of a diet.
2. To show users major sources of nutrients and food components in their diets.
3. To demonstrate the effects of dietary changes (types or quantities of food) on nutrient levels.

**Features**

1. The program analyzes food energy (kilocalories), protein, total fat, saturated fatty acids, monounsaturated fatty acids, polyunsaturated fatty acids, carbohydrate, dietary fiber, cholesterol, carotenes, alcohol, thiamin, riboflavin, preformed niacin, folacin, Ca, P, Mg, K, Na, Zn, Cu, and vitamins A, B6, B12, C, and E.

2. The disk includes about 60 pages of documentation, but program can be run strictly from the menu. Included in the documentation are interpretive materials that can be handed out to help users understand the results of the dietary analysis.

**Hardware requirements**

IBM compatible computer with 2 drives or 1 drive and a hard disk.

Order from:
The Software Labs
3767 Overland Ave, #112-115
Los Angeles, CA 90034
Order only: (800) 359-9998
Tech. Support: (213) 559-5456

2-Disk set: #1856 and #1857 costs $7.38 plus $4.00 shipping and handling. Is available in 31/2 or 51/4 inch disks.

The SwapSheet Editor's mailbag has been empty of late. Why not jot down a couple strategies, demos, analogies, or just plain good ideas that you use in your teaching and send them to:

William Nicholson
SWAPSHEET Editor
Department of Natural Sciences
University of Arkansas
Monticello, AR 71655
The Discovery of Insulin

by Wayne Carley
Department of Biology,
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Beaumont, Texas 77710

In 1920 J. J. R. Macleod was Professor of Physiology at the University of Toronto when alumnus and country surgeon Fred Banting approached him about working on the role of the pancreas in diabetes (a word Banting could not even spell). Banting, who knew nothing of previous failures with pancreatic extracts, had a novel idea about how to separate the internal secretion regulating blood sugar from the powerful digestive enzymes of the exocrine pancreas. A skeptical Macleod allowed Banting a small research space and even assigned him a young medical student assistant, Charlie Best. Banting and Best worked in relative isolation from the rest of Macleod's lab - until the research began to heat up. Biochemist J. B. Collip soon joined the race. All four of these men had powerful egos, and work in the lab varied from cooperative to combative. But together they isolated insulin and completed the first successful human insulin therapy.

Banting always believed he and Best had done the true isolation of insulin and deserved the credit. The Nobel Prize Committee thought otherwise and awarded the 1923 Prize in Physiology or Medicine to Banting and Macleod! Banting was absolutely livid, and immediately divided his share of the prize with Best. Not to be outdone, Macleod shared his winnings with Collip. Best went on to become one of the best physiologists of the first half of the 20th century. Collip became Dean of the Medical School at the University of Western Ontario. Macleod eventually returned to his native Scotland, at least in part because of Banting's "unrelenting hatred" of him.

The fascinating story of these men, their times, and the turbulent road to insulin comes alive in Michael Bliss' The Discovery of Insulin (1982, University of Chicago Press). Even for those familiar with the story, the discovery of insulin is as thrilling as any mystery novel. The recent notes about Banting and Best in HAPS News suggest that many of you are interested in this historical event. I have written earlier about humanizing science to ease students' entry into a topic [HAPS News 2 (1)] and the story of insulin is a great place to start.

Critical Thinking About A & P

by Wayne Carley
Department of Biology,
Lamar University
Beaumont, Texas 77710

Science education is at a crossroads in the United States. Although everyone decries the current crisis, innovations and new research promise to make a major impact on how we teach. Some of these ideas that apply to teaching Anatomy and Physiology are presented in a series of articles in the November, 1991 (vol. 21), issue of the Journal of College Science Teaching.

Lipson and Tobias begin (pp. 92-95) by asking the provocative question "Why do some of our best college students leave science?" They argue that many bright students leave science majors because of the way science is taught. Young people with a variety of learning styles and personalities are exposed to a single teaching style (lecturing) in a large, competitive classroom where the emphasis often is on memorizing or problem-solving techniques rather than understanding concepts - all compounded by a grading curve in which other people's scores may determine your grade. Although most of our A&P students are not "hard-core" science types, they face the same problems. We need to think seriously about how we structure our courses and the learning opportunities we offer students to maximize their performance.

Analytical skills are one of the most important abilities for both science students and healthcare professionals. Rau (pp. 97-99) gets students to think about science by summarizing articles in the literature. Writing a summary requires them to figure out what is important, what themes arise, and what might be questionable or not relevant. Students submit questions that arose after their study to see how they are thinking analytically about the problem and whether they can plan experiments and analyze data.
For many students science is interesting only when they can apply it. Dunkhase and Fenick offer "Problem solving for the real world" (pp. 100-105) as one criterion for innovative science teaching. Courses identified as innovative by the Society for College Science Teaching have a common theme of presenting science through problem-solving applied to real world situations. Students work through identification of the problem, investigation and analysis, and presentation of the results. This active learning would be ideal for clinical case studies in A&P, allowing students to learn by doing the kinds of things they will be expected to do as working healthcare professionals.

Finally, Kincannon (pp. 112-113) uses Allen's technique of having students explain each possible answer on a multiple choice test instead of just circling the one they believe correct. This method forces students to think critically about the subject rather than just memorizing key words and phrases.

Negative and Positive Selection

by Sandra R. Grabowski
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In the past three years several of the mechanisms whereby B and T lymphocytes (B and T cells) develop the capability to discriminate self from nonself antigens have been partially revealed. A seminal paper is one by von Boehmer and Kisielow that outlines evidence for the existence of both negative and positive selection of T cells. Negative selection means the deletion (destruction) of potentially harmful T cells that bind to (recognize) self antigens presented in association with self MHC molecules. Positive selection is a process for selecting and allowing maturation of useful T cells; that is, it permits survival of those T cells that can recognize a self MHC molecule and respond to a foreign peptide associated with it.

Both negative and positive selection occur while T cells are maturing in the thymus. Immature T cells enter the thymus as CD4-8- cells; they express neither CD4 nor CD8. The CD4-8- precursors develop into CD4+ (helper) or CD8+ (killer) T cells through CD4+8+ intermediates. Negative selection (deletion) occurs when such intermediate cells bind to self peptides that are combined with self MHC molecules. In other words, "antigen" recognition by CD4+8+ cells leads to their destruction. In this way, all CD4+8+ cells that bind to self-peptides are weeded out, leaving a population of cells that do not bind to self-antigens. This process confers tolerance to self-antigens.

Experiments described in this paper suggest that positive selection can occur at about the same developmental stage as or later than negative selection. Positive selection ensures that T cells entering the peripheral T cell pool will be useful; that is, they are able to recognize self MHC molecules. In addition, T cells differentiate into either CD4+ or CD8+ cells as a consequence of positive selection. Binding of its receptor (TCR or T cell receptor) to a class I MHC molecule induces differentiation of a CD4+8+ T cell into a CD4+8- (helper) T cell. Thus T cells leaving the thymus are either CD4+ or CD8+.

Details of the molecular mechanisms of negative and positive selection in T cells are still being elucidated. Recent papers have also indicated that similar mechanisms for achieving self-tolerance operate in B cells. Both clonal anergy (inactivation of a B cell clone) and clonal deletion (destruction of a B cell clone) have been described.


Other papers of interest by von Boehmer:


AIDS: Clinical and Epidemiological Considerations

presented by
Dr. David Potts, M.D.,
Director of Internal Medicine
Greenville Memorial
Hospital, and Associate
Professor of Medicine,
Medical University of South
Carolina

AIDS - the most feared plague in modern history. There are about 1.2 million cases worldwide and the number of cases is expected to almost double in the four-year period from 1989 to 1993. There are an estimated five to ten carriers of the HIV virus for each active case of AIDS, and each infected person has a high probability of developing the disease. It is expected that all the people who develop AIDS will die as a result of the condition. Death is due to the loss of immunity and the conquest of the body by various pathogens or conditions caused by a compromised immunity. The virus is spread mainly by asymptomatic or undiagnosed people.

There are only three recognized methods for transmitting the virus: (1) through sexual intercourse (oral, vaginal, or anal), (2) by exchange of contaminated blood, as in sharing of hypodermic needles, and (3) from an infected mother to her fetus before birth or to her newborn in breast milk. Except for newborns and infants, most of the people who have become infected with HIV have placed themselves at risk. Care givers have not been known to contract the disease without blood to blood contact.

The risk of becoming infected with HIV is not as high as often believed. The risk is from one in two hundred to one in four hundred for each sexual contact or accidental needle puncture. The chance of receiving HIV in a random blood transfusion in the United States is one in half a million to one in one million, according to Dr. Potts. What was once considered a disease of homosexuals is now known to be spread by heterosexual contacts as well. It is estimated that in the United States the rate of increase of HIV infections due to heterosexual contacts will triple over the four-year period from 1989 to 1993. In Africa and India, heterosexual contact already is the prime route for HIV infection.

AIDS is a syndrome with a list of conditions that vary according to the origin of the patient. Often, diseases endemic to his hometown arise. This knowledge can help the physician by allowing the administration of drugs to prevent the secondary pathogen from growing.

Most of the cases follow a pattern. Just after infection, the number of viruses may be high and the person has flu-like symptoms. Then the viral titer falls and the person feels much better. After an average of 9.8 years, the infection causes the development of severe symptoms. These usually include common childhood diseases, swollen lymph nodes, diarrhea, thrush, pneumonia, wasting and many other symptoms. There is no cure for AIDS, and despite intense research a cure is not even on the horizon. HIV is a retrovirus that preferentially infects helper T cells and uses reverse transcriptase to encode its own RNA into the host's DNA. Destroying the host's own cells would only further weaken the patient. AZT, which blocks activity of reverse transcriptase, may prolong the onset of the serious symptoms, but does not reduce mortality. A vaccine is not yet possible and will be difficult to develop. If developed, it will have to be widely available, inexpensive and safe.

Then what is the answer? At this time it is education. People must know how the disease is transmitted and understand that it is fatal. They need to be trained how to prevent the infection. As the virus spreads in this country, heterosexual contact will be a more common transmission route. HIV is already in every state. Counseling is also needed for those who abuse drugs. The educator may be able to do more to prevent the spread of AIDS, especially among the young people, than any other professional.

--- reported by
Michael A. Dorset
Assoc. Prof. of Biology,
Cleveland State CC,
Cleveland, TN 37312
What Makes A Being Human?

presented by
Doug McDonald, Ph.D.
Professor of Philosophy
Furman University
Greenville, South Carolina

Are you rational? Maybe passionate? How about relational and filled with self-transcendent consciousness? Hedonistic? These four competing theories of the true essence of being human set the boundaries of the conflicts we wrestle with in modern medical ethics, according to Dr. Douglas McDonald of Furman University. The lead-off speaker at the 1991 HAPS Conference in Greenville, S.C., McDonald presented a moving and stimulating review of the moral philosophies we use to make ethical decisions.

McDonald's thesis is: we are in ethical hard times. Rather than engaging in meaningful dialogues, opposing camps are dug in and lobbing shells at each other. Believing that only if we know how we got here, can we get out of the trenches and begin talking to solve the present moral impasse, McDonald focused on the historical development of modern ethics.

Our conflicts arise from our culture, and their seeds were sown during the enlightenment. Two ways of thinking determine how we view ethical dilemmas. **Consequentialists** believe an action is moral if it produces the most good for the most people over the long term. This philosophy of John Stuart Mill is also known as utilitarianism. **Deontology**, on the other hand, posits that certain actions in and of themselves are morally correct despite any consequences they might have. If Truman had been a deontologist, he would not have dropped the atomic bombs on Japan. Of course, most of us are both consequentialist and deontological at different times and over different issues. However, the conflicts between these competing moral philosophies divide society. Within one construct you can debate an issue -- what *really* are the consequences of this action? And we can make human mistakes because we misjudge the outcome of an event. But between philosophical schools, debate is blocked. The consequentialist says to the deontologist -- and vice versa -- "You've got it all wrong! This competition and conflict is most clearly seen in the abortion debate.

Within either of these moral frameworks we must ask "what are the important moral facts in this case?" Moral facts are normative moral concepts and human ethical value judgments. In medicine, defining the moral facts of an issue depends centrally on what a human being is. And so we return to our opening question. One possibility is that we are strictly biological beings with an inherent right to forge ahead with our lives as long as possible. The movie *Coma* provides an extreme example of such a philosophy. Most people, however, believe that such a life is biological; something else makes us human. So we come to the four theories of what makes a being human:

1. **Rationality.** Socrates tells us "the unexamined life is not worth living." To Socrates, the importance of being human was the capacity for rational thought, to justify one's actions and tell why a belief was held. In this rational view of human life, the truth matters; the search for truth matters even more. The goal of the search - a long one always done from argument - is to find the truth and to live it.

2. **Passion.** Van Gogh and Beethoven exemplify the drive, emotion, and commitment that make us human. This deep passion is not desire, but is caring about something with all of one's being. In the passionate view of humanity, we must ultimately find what we love and be true to it our whole lives. One of the saddest aspects of modern nursing homes is that they and their residents lack this passion.

3. **Relationships.** We are persons of self-transcendent consciousness. We can use the pronoun "I" because we can see ourselves in relation to other selves. CBS's 60 minutes ran a segment on a severely retarded boy living in an institution and cut off from his family. Johnny was not capable of rational thought in the Greek sense, nor even of passion, but on the birthday of the social worker who cared for him, Johnny gave her a crude necklace he had made. Is this what makes us human, that we care enough to want to give someone a gift? The problem with relational humanity is that my humanity depends on you. Without relationships, we are cut off from humanity. Martin Buber, in *I and Thou*, argues that in modern society we've been robbed of
relationships. Again, modern medical facilities and nursing homes do not allow relationships to develop or even continue.

4. Hedonism. We are creatures of desire (not passion this time). We are human when our pleasures exceed our pains. Hedonism includes all pleasures -- Mozart, Julia Child's cooking, sex, and scratching itches. Are we not all hedonists? The hedonist says that when suffering in human life and its long-term prospects outweigh pleasure, life is not human. The moral society therefore wants to alleviate suffering.

Which camp do you fall into? Probably, we all share all four in part. And this leads to moral confusions. In sorting out these confusions, we can distinguish two states of disease. Illness may be an impediment to living that keeps us from doing what we want; it may be overcome, even strengthening our lives. On the other hand illness or disease may become a form of life. If that form of life is abhorrent to the person (Alzheimer's, for example), then is not active euthanasia OK?

What are the criteria we should apply to decide which views of human nature we should tolerate? McDonald offers five:

(1) It opens the possibility of choice
(2) It produces heightened self-worth
(3) It promotes love, benevolence, and moral respect for others
(4) It produces free inquiry, tolerance, and justice
(5) It fosters a deep sense of moral equality.

If the basis for a decision meets these criteria, we must allow the person in the dilemma to make the decision, even if it means making a serious moral mistake. McDonald's final thought centered on this moral mistake. If we apply the criteria and make the best decision we can, making the mistake is an acceptable consequence. McDonald's own father told him "Don't be afraid to fail; I will be there for you." McDonald concluded by comparing this statement to the essence of Christianity. All Christians experience moral failure, but a steadfast God is there when they do.

The relevance of this stirring presentation was illustrated by McDonald's answer to a question. When asked if we should teach such moral philosophy, McDonald replied that our job is to teach students how to think and that questions of an ethical nature will arise. When they do, we must provide students with the means to solve the problem and the criteria to judge the worth of the solution.

Now try out your moral philosophy on these two problems posed by McDonald.

Your life-long best friend, Sam Walton, dies without a will. On his deathbed he tells you to set aside $2 million for yourself and give all the rest of his estate for animal shelters, because animals were the only ones who did not relate to him strictly for money. You go to court and tell the judge Sam wanted to give $2 million to animals and the balance to indigent human health care. Was it moral to lie?

As the sheriff in a small, racially divided and hostile Alabama town in the 1950's, you arrest (again) the town drunk, John, to give him a place to sleep and eat. Meanwhile, the Mayor's daughter, a beautiful, popular white girl, has been murdered and black power slogans cover the walls of her room. To prevent the race riot you know is about to occur, you tell the gathered crowd that you already have the suspect in jail and that John tried to cover his senseless, drunken rage by blaming it on the blacks. Two months later John, who has no family, friends, or home, dies quietly from complications of alcoholism in a warm hospital, never having left your custody. The real murderer was never found. Did you do the right thing?

---reported by Wayne Carley, Ph.D.
Department of Biology
Lamar University
Beaumont, TX 77710

Colleges Biosciences Association
5th Annual Conference
June 2 & 3, 1992
George Brown College
St. James Campus

Conference fee $85
Accommodation $65

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Helen Colman
at George Brown
FAX [416]867-2302
The Medical Artist: Communicating Visually

presented by
Ms. Jeanet Dreskin
Greenville Art Museum
Greenville, SC

A graduate of Johns Hopkins, Ms. Jeanet Dreskin gave us a unique perspective on teaching anatomy and physiology. She provided insight into the role of a medical artist: a person who is trying to convey a visual image of the concept the scientist is trying to convey. This person must work with a scientist, personally review the subject and make preliminary sketches. The drawings must suit the audience it will serve, such as fifth graders, physicians, or lawyers, and all the drawings must be technically correct.

Ms. Dreskin's art is primarily two dimensional using water colors, but other medical artists may create three dimensional figures, use photography, or design computer generated graphics. Some artists specialize in one area, such as the eye or ear, whereas others produce a diversity of work.

In explaining the training one needs to become a medical artist, the speaker emphasized that the medical art was a wonderful way to make a living as one can combine two strong interests. After completing a fine arts degree, one must attend a medical school and take many of the same courses that a medical student would take that would involve visual imagery, (histology, anatomy, watch operative procedures) and prepare portfolio. Medical Art is a very competitive field with only one out of five applicants being accepted at the 7 major schools that have medical art training.

Ms. Dreskin also explained the difference between medical art and science illustration. While medical art concentrates on the human body, science illustration would encompass a far broader range that would include zoology, botany, invertebrates, etc. She also pointed out that diagrams are often better than photographs for study because areas of interest can be clearly defined, isolated, enlarged and clarified.

Through a series of photographic slides of medieval woodcuts and da Vinci's sketches to modern sketches (with examples of her own work) Ms. Dreskin gave an excellent visual explanation of the step-by-step procedure required to produce illustrations we find in our textbooks and journals. Her pictures were diagrammatic, realistic and interpretive. Her enthusiasm was contagious and those in attendance have a greater appreciation for this profession. For those interested in more information about this type of career, she gave the following addresses:

Science Illustration
P.O. Box 652
Ben Franklin Station
Washington, D.C. 20044

Medical Artists
National Association of Medical Illustrators, 1819 Peachtree Street,
N.E., Suite 560
Atlanta, Georgia 30309

Medical Photographers,
Prosthesis, Medical Art
Assn. of Biomedical
Communications Dept.
MS Hersey Medical Center
P.O. Box 850
Hersey, Pennsylvania 17033

--- reported by
Eloise Renwand
Science Instructor, Providence
Hospital School of Nursing
1912 Hayes Ave.
Sandusky, OH 44870

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[Editor's note: The two articles on this page are not typical Conference Reports. Mark Robertson allowed me to twist his arm to write a "how does it feel to be a newcomer at a HAPS Conference" article for HAPS News. His article "Homecoming" hints that he may have caught HAPS fever, first reported to the CDC in about 1988. The second piece is a reprint of a product insert kindly provided by Kent VanDeGraaff, who suggests keeping a bottle of Damitol in every A&P lab and lecture hall. He finds that regular doses of Damitol keep his students on a long-lived "A&P high."]

A Homecoming
from Mark Robertson
Delta College
University Center, MI 48710

I really enjoyed the 1991 HAPS conference at Greenville, but I sometimes wonder if it wasn't for the wrong reasons! You see, I'm originally a Virginia native, recently transplanted to Michigan. Now I hope you understand that I really enjoy my new job here (Delta is a fine institution and the people are more than friendly), but something is still missing.

Normally, when one sits down to write a reaction to a first experience, the tendency is to thank people for the great jobs they did in providing that experience for you. The problem is that at Greenville, everyone did such a great job of organizing and running the conference that I can't really just thank one or two individuals. From the constant aid of Karen LaFleur long before I left Michigan to the fine leadership of Virginia Rivers once we arrived, I found myself spending more time immersing myself in the event, and not the hundreds of people I met. Social gatherings occurred everyday, from lunch with a small group at a local Greek restaurant to ice cream gorging at Clemson after touring the gardens. During this working vacation, a wonderful diversity of topics kept me occupied. Each speaker seemed to compliment the last, from the artistic exuberance of Jeanet Dreskin to the timely updates from Cookie Hannah on the "new drugs" that kids are finding today. Martine LaBerge's love of life made me laugh along with her, and Robert Allen gave me good food for thought concerning my approach to teaching and my expectations from the students. Visits to the Clemson and Furman campuses broke up any "site-monotony" that might otherwise set in, and a local production of "Driving Miss Daisy" allowed me some cultural enrichment. As I said good-bye to everyone and packed my bags to leave Thursday evening, however, I suddenly realized I was leaving more than the conference behind. I was also leaving my heritage.

I stayed at the Paris Mountain campground while attending the conference. Without consciously realizing it, I had just spent a week in the hardwood forests, smelling the tell-tale odor of honeysuckle, and falling asleep to the sounds of southern insects. As I drank my coffee on that last morning and watched the sun rise over the mountains peaks, a deep sense of melancholy finally settled in. There are no mountains in Michigan. Regardless of how many people try and excite me about the upper peninsula, I know that the mountains that I am used to can only be found in Virginia, W. Virginia, Tennessee, and the Carolinas. All of the experiences that finally drove me to become a biologist are rooted in that heritage. I was used to free-running spring water and timber rattler basking on the razorbacks. As I looked back on that week in Carolina, I can't help but wonder: Did I enjoy the HAPS so much because of its location, or because of its content? Being a good scientist, I have come up with a simple test.

Next year the conference is in San Diego, California. I have never been to California. I wonder, do they have mountains out there?

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Ingredients: 100% pure candy (sugar, dextrose, cornstarch, artificial flavor, U.S. certified food color). Also known as Jelly Beans.

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WHEN COMPROMISE IS NOT ENOUGH

from Theresa W. Page
Biology Department
Texas Woman's University
Denton, Texas 76204

How much compromise can we accept in the teaching of anatomy and physiology before the integrity of the course or program is violated? Is it a workable compromise if all animal experimentation or dissection is removed from a course to placate animal rights protest groups? Should student protesters who refuse to perform the required work in a course be given a passing grade? And who ultimately determines what may or may not be included in a course--the students who have enrolled in the course or the instructor who teaches it?

My response to these questions has been to change the rules governing enrollment and performance in those classes which involve animal use. At the first class meeting I simply read the university policy on animal experimentation and dissection. Students who wish to be exempted from a specific course or from a specific experiment within a course must obtain a ruling from the appropriate university committee within a given time period (usually one week) after notification. Students who choose to remain in course are required to sign a form stating that they have read the university policy statement and have been notified that animal experimentation or dissection is a required part of the course. It is emphasized that remaining in the course indicates a willingness to participate in animal experimentation or dissection.

If exemption is approved by the committee, alternative assignments are provided. Students may be given an assignment to write a balanced and thoroughly-researched paper on the pros and cons of animal research in discovering a cure or treatment for some disease. The assignment may include meeting with departmental faculty who are currently involved in research that utilizes animals to discuss how and why animal use is important in a particular research project. In addition to the research paper, students are responsible for all the material covered in the course relevant to the exams.

Presenting all the options objectively at the first class meeting appears to prevent major problems in three ways: (1) being given a choice seems to appease those students who are not sure how they really feel about the issue and forces those who are serious about the issue to make a decision immediately, (2) having one's views respected appears to promote respect for the views of others and (3) being honest and objective with students encourages their honesty and objectivity about this very emotional issue.

It is our obligation as educators to display the courage of our convictions by providing leadership on this issue. We must not permit animal rights advocates to dictate our actions, but neither should we refuse to listen and give serious considerations to their views. Intellectual freedom is born out of an open discussion of ideas; in its absence, universities and colleges and their faculty simply become a reflection of the most rigid and intolerant elements in a society.

[Editor's note: Does Theresa Page's thoughtful and stimulating article provoke an alternate point of view? Have you faced a similar situation and found different answers to a potentially troublesome problem? Let other HAPS members know your "point of view" by writing a letter to the editor of HAPS News.]
CANDIDATE INFORMATION FOR
THE HUMAN ANATOMY AND PHYSIOLOGY SOCIETY
OFFICERS, NEWSLETTER EDITOR, AND APPOINTED COMMITTEE MEMBERS

Name ________________________________ Position ________________________________

Business Address:

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Highest degree: _____ B.A./B.S. _____ M.A./M.S. _____ Ph.D. _____ M.D.

College or University where highest degree was obtained: ____________________________

Subject area of greatest professional interest: ____________________________

How many years have you taught Human Anatomy & Physiology? ________________

List other human-oriented courses you presently teach (e.g. Physiology, Anatomy, Human Biology):

List other courses you presently teach (e.g. Botany, Zoology, Cell Biology):

What offices have you held in local, state or national organizations? (List organization, positions held, and dates. Include non-professional as well as professional organizations.)

For what Executive Board offices would you be willing to serve as a nominee? (Check one or more.)

Please include a brief statement (not to exceed 200 words) of your interest or goals concerning HAPS that could be published in the next issue of HAPS News.

_____ President Elect (3 yr. term) _____ Secretary-Treasurer (1 yr. term) _____ Member-At-Large (2 yr. term)

Would you like to be considered for the position of Editor of HAPS News?

_____ YES (Please include information relevant to your experience in this area.)

On what committees would you be willing to serve? (Check one or more.)

_____ Membership Committee _____ Annual Conference Committee

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_____ Editorial Board of Newsletter (review submitted articles and contribute in areas of interest) _____ Core Curriculum Committee

MAIL BY MARCH 30, 1992 TO:

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