A LIGAND BY ANY OTHER NAME

by Judith Sparlin
School of Nursing
Clarion University of Pennsylvania
4900 Friendship Avenue
Pittsburgh, PA 15224

Of all the tools I give my students to help them understand physiology, one of the most useful is the concept of ligands and their receptors. Yet, most textbooks fail to deal with the universal application of this concept.

A ligand, as defined by Vander, Sherman, and Luciano (Human Physiology, McGraw-Hill, 1990), is "any molecule or ion which is bound to the surface of a protein by forces other than covalent bonds." These forces include ionic attractions between polar or ionic regions of molecules and the Van der Waals forces between nonpolar regions. Cellular proteins (and glycoproteins) that bind ligands are receptors for that ligand. Examples include insulin receptors, LDL receptors, and acetylcholine receptors. From these examples, we see that ligands include hormones, neurotransmitters, and other substances. Vander et al. explain further that the "region of a protein to which a ligand binds is known as a binding site." A protein may contain several binding sites, each specific for a different ligand.

As I teach my students about ligands and binding sites, I don't get the bewildered looks one might expect. Instead, I see their faces light with recognition as they recall concepts learned in high school. They understand quickly that the specificity of ligand-receptor binding is similar to that of the enzyme-substrate, lock-and-key mechanism. Upon this concept can be built an understanding of the metabolic effects related to percent saturation of the receptor binding sites.

Their comprehension is obvious when they see a transparency of neurotransmitters (ligands) moving across a synaptic gap towards receptors on a postsynaptic membrane. There may even be pleased smiles as technical understanding illuminates common knowledge. They enter class knowing that carbon monoxide kills and that antihistamines are taken for colds. They leave knowing that carbon monoxide and oxygen, antihistamines and histamines are competing ligands for chemically specific binding sites on hemoglobin and blood vessels, respectively.

The position of "Ligands and Receptors" in an A & P course is important. The early chapters of most texts give an overview of organic chemistry. Protein structure is followed by DNA. A discussion of ligands and receptor binding sites works well between these two. Knowledge of tertiary/quaternary protein structure is needed for understanding both chemical specificity and function of proteins. Having established the significance of the shape of a protein to its function, the importance of DNA in determining protein shape becomes evident.

Adult students aren't uncritical sponges. As their teacher, it's vital for me to answer the "Why do we have to know this?" question before it's even asked. From the first introduction of the ligand and receptor concept, I stress its importance, pointing out applications in almost every chapter of the text. The ligand may be an enzyme substrate, hormone, neurotransmitter, drug, environmental factor, or antigen. The binding site could be on an enzyme, antibody, hemoglobin molecule or plasma membrane protein. The same physiological principles apply.

When I encounter former students, they often say, "Guess what we're studying in Pathophysiology (or Microbiology or Advanced Nursing)!" I know the answer. These classes may not use the terminology, but my students easily recognize and understand the concepts involved: ligands and receptors.

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1991 Conference Shaping Up in Greenville, South Carolina

DAYLIFE: CHATTOOGA RIVER!
Test your nerves and your paddling skills on the mighty Chat-tooga River! Two group-rate excursion reservations (each for 16 per-sons) have been made, one on May 26 (Sunday, cost $50 per person) and one on May 28 (Tuesday, cost $37 per person). A bus surcharge to Long Creek, SC will be added to the cost. These all-day trips, on the wild and scenic Chattooga River (of Deliverance fame), are guided by experienced outfitters. Trips include all gear, boats, trained guides, and lunch. These trips are spectacular and loads of fun! For safety, some restrictions apply. For example, children under 60 pounds cannot participate. Please send your name(s) in early to hold your raft slot.

NIGHTLIFE: DRIVING MISS DAISY
Theatre on the Green, Greenville's award-winning "little theater," is holding a block of tickets for HAPS participants for the preview performance of Driving Miss Daisy on Wednesday, May 29, 1991.
Ticket prices will be discounted and will be about $14. The theater is located three blocks from the Hyatt—an easy, pleasant walk. For ticket reservations, either call (803) 233-6238 or write: Theatre on the Green Box Office, 444 College Avenue, Greenville, SC 29601.

ROOMATE LISTING
To enable you to contact a potential roommate for the '91 HAPS Conference in South Carolina, we will compile a master list of all individuals who are interested in finding someone with whom to share a room. The entire list will be mailed two months before the conference to all who have put their names on it. This will enable you to contact one another before finalizing your hotel reservation.

If you are interested in this cost-saving option, please send a postcard with your name, gender, address, smoking preference, phone number(s), and best times to reach you to:
Karen LaFleur '81, HAPS Conf. Coordinator
Greenville Technical College
Box 5616 Station B
Greenville, SC 29606

The menu at the University Center Restaurant at California State University in Sacramento included, one day recently, "Sauteed Mushrooms with Shallot Butter Sauce."
(Marginalia in the Chronicle of Higher Education, January 16, 1991)
Looking for ways to avoid formaldehyde? Here are two alternatives.

Recently I've been hard-pressed to find a formaldehyde-free alternative to dissection specimens because one of my students suffers a severe asthmatic response when inhaling formaldehyde in concentrations less than 0.08 ppm! After speaking with many biological supply house representatives at the November 1990 Pennsylvania Science Teachers' Association Convention in Reading, PA, I discovered that truly formaldehyde-free specimens do exist.

I understand from talking with David Hall at South Western Biological Research (602-745-7879) that SWB has developed a process, involving cross-linking of primary amines with a "highly reactive" trade-secret agent, which allows them to fix cats, pigs, frogs, etc. with absolutely no formaldehyde. The specimens can be obtained with standard single, double, and triple injection options.

The fixative is completely consumed during processing. Reportedly, the end product could be eaten and would act simply as "roughage." The lab specimens, however, contain small additive concentrations of mold inhibitors such as phenol and propylene glycol, and so gloves and goggles should be worn. The lengthy fixation process discolors the specimen to a shade of brown (in contrast to the grey seen with formaldehyde), and the discoloration can stain the dissector's fingers.

David approved my sharing this information with the HAPS audience, so long as you are aware that, at this stage, SWB does all of its own processing. Specimens are available through their own marketing branch: Delta Biological, P.O. Box 26666, Tucson, AZ 85726.

Especially during the months from August through October, 45 days or more may be needed to fill an order. Call 1-800-821-2502 for current information.

Bill Betzer
Claremont University
Venango Campus
Oil City, PA 16301

A relatively new option to formalin-fixed biological material is the patented process known as Plastination. This straightforward but elegant technique replaces the water and fat in tissues with supple silicone resins. The result is an accurate, odor-free, non-toxic, and durable specimen capable of withstanding years of handling. Certainly, our society should invite a workshop on this process at a future HAPS Conference.

Plastinated specimens have been offered for sale through Carolina Biological Supply for some years now. The technology needed to prepare Plastinated material is not particularly exotic or difficult to learn. In fact, the apparatus needed for a Plastination lab can be acquired for under $10,000. Any college can produce plastinated material for biology, botany, zoology or A & P courses. Chaffey College makes this service available for customer-supplied specimens on a price per kilogram basis. For those interested in more information, I recommend the following sources:

International Society for Plastination
Mercer University
School of Medicine
Macon, Georgia 31207

Robert W. Henry, DVM, PhD
College of Veterinary Medicine
University of Tennessee
Knoxville, TN 37901-1071

Jim Johnson
Plastination Technician
Chaffey College
5885 Haven Ave.
Rancho Cucamonga, CA 91701

Stephen Langjahr
Division of Math-Science
Antelope Valley College
Lancaster, CA 93536-5426

If you have broken a skeleton (real or plastic), help is in sight. The Medical Plastics Laboratory may be able to repair or replace the broken bones. Contact them to see what repairs are possible.

Medical Plastics Laboratory
P.O. Box 38
Gatesville, TX 76528
1-800-433-5539

Milly J. Galliher
Science, Math & Social Sciences
Cochise College
Rt. 1, Box 100
Douglas, AZ 85607
MEET THE 1990-91 OFFICERS OF HAPS

Richard Welton, President of HAPS, grew up in Wenatchee, Washington, on the banks of the Columbia River. He did his undergraduate work at Washington State University and his graduate work at Oregon State University. At the end of eight years of college work, which had been directed exclusively towards research, he decided to teach. After receiving his doctorate, he moved to Ashland, Oregon and took his first teaching job at Southern Oregon State College. After twenty-seven years, he still enjoys his work.

Outside the classroom, he is active in scouting, the American Lung Association, the federally funded Commit to Quit smoking cessation program, and the Oregon Lions Sight and Hearing Center. For the past two years, he has been conducting a research study of radon in homes in the Rogue River Valley of Oregon in an attempt to correlate radon content of homes with soil structure and home construction.

Welton and his wife Alice have two children, a 27 year old daughter who lives in Geneva, Switzerland, and a 22 year old son who operates a small business in Oregon.

Lew Milner, contributing to HAPS as Secretary-Treasurer for a second term of office, has taught human anatomy and physiology at North Central Technical College in Mansfield, Ohio since 1976. Additional teaching responsibilities have included microbiology, chemistry, kinesiology, and aging. Recently, he accepted the position of Dean of Health Sciences but is still actively involved in teaching.

Lew has his Master’s degree from the University of Dayton and has completed advanced graduate courses at Texas Tech University. He is a past member of a local School Board and has served on the Council at his church. He is also active in Scouting and currently is Assistant Cubmaster.

Lew is married and has three children. Recently, his youngest child, who is in kindergarten, brought home a family portrait that she drew. Guess who was missing from the picture! Lew has promised to spend more time at home.

Bob Anthony, Member-At-Large on the HAPS Executive Board, has been teaching human anatomy and physiology at Triton College, located west of Chicago, for twenty years. His major teaching responsibilities are two courses designed for pre-professional allied health students. The first course in anatomy utilizes a regional approach, and the second course stresses molecular and systemic physiology. Bob is a former president of the Illinois Association of Community College Biologists and was the director of the 1987 and 1988 Anatomy and Physiology Workshops conducted at Triton. The people who flocked to these two workshops formed HAPS in June 1988.

Bob’s spare time is mainly spent trying to keep up with his wife, three daughters, and the family home, a 130 year old farm house near Batavia, Illinois. He is presently on a sabbatical leave from Triton, experiencing life as a struggling student at the University of Illinois-Chicago.

Donna Van Wynsbergh, chair of the HAPS Editorial Board, received her B.A. in Biology from Clarke College in Dubuque, Iowa, and her Ph.D. in Physiology from Marquette University in Milwaukee. She teaches undergraduate courses in human A & P and human physiology plus graduate-level courses in cardiovascular and respiratory physiology. Her research focuses on neural control of blood pressure. She is characterizing the firing pattern of the aortic baroreceptors in normal and hypertensive rats in the absence and presence of 4-aminopyridine (4-AP), which blocks the transient potassium A-current. The results suggest that blocking the A-current can change the pressure threshold without altering sensitivity of the baroreceptors.

In addition to teaching and research, Van Wynsbergh supervises and mentors M.S. and Ph.D. students and is coauthor with G. M. Cooley of Case Studies in Medical Physiology (W. C. Brown, 1990), a small book of thought-provoking problems for undergraduate students. Her favorite other activities include giving live performances of “show and tell” science for Milwaukee area residents as part of the Science Bag series and developing computer interfacing in the physiology lab. But her all-time favorite things include motorcycle riding and guitar playing!

Editor’s note: Remaining officers will be profiled in the next issue.
WILL YOU HELP IN 1991-1992? NOMINATIONS

The constitution of HAPS directs that the nominating committee is to prepare an annual ballot of nominees for elected positions within the Society, with the president-elect 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, Elaine Marleb of Holyoke Community College in Massachusetts, Eloise Renwand of Providence Hospital of Nursing in Ohio, and Virginia Rivers of Truckee Meadows Community College in Reno, Nevada.

The Nominating Committee is now soliciting nominations for officers and for appointed committee members from the membership. If you are willing to serve as an officer 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 Virginia Rivers by March 1. If you know of members who would be good candidates, please encourage them to submit their names. Officers and committee members elected and selected this year will serve from June 1991 to June 1992.

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, which will be mailed in mid-April. The ballots will be returned to the Nominating Committee, and the results announced at our annual meeting.

-- Virginia Rivers
Truckee Meadows C C
Nominating Committee Chair

APPEAL FOR ARTICLES

In looking at our first two newsletters this year, it is obvious that the vast majority of the articles have been prepared by a small group of people, primarily those serving on HAPS committees. With a membership of nearly 500, we should have a wealth of ideas for great newsletter items.

There are a variety of areas in which you could contribute a shorter or longer piece. I am quite sure every member has one or more laboratory or lecture demonstration ideas that other members would like to hear about. We all read articles in other publications and occasionally find one that is a gold mine! Maybe you have a question that has been puzzling you for a long time and would like to seek an answer from your colleagues.

Possibly you have prepared a videotape, a computer program or a set of slides you would like to tell the group about. Is there something you have found very successful in advising of students or the operation of a club? Perhaps you are using a novel technique for preparation of materials for the laboratory. Maybe you have techniques for getting students more actively involved in classroom activities. Possibly you have discovered a free or inexpensive source of materials that normally cut deeply into our budgets.

The list goes on and on of areas in which you could contribute to the newsletter and thus to your colleagues. While some of your New Year's resolutions may already have fallen by the wayside, please make a commitment to provide at least one contribution to the newsletter during the coming year. Consider it a professional obligation. A single contribution from every member would provide about 500 significant ideas for each of us (and a full mailbox for our editor, who loves to get mail). 

-- Richard Welton
Southern Oregon State College
HAPS President

MEETINGS

The Spring FASEB/American Physiological Society Meeting in Atlanta, Georgia, will include a "Workshop on Integrative Study in Physiology and Medicine" on April 20, 1991. The program includes a dialogue on integrative science, a medical case history presentation and analysis and a working discussion lunch.

The Boston meeting of the Society of College Science Teachers (SCST) in 1992 will include a session that focuses on teaching anatomy and physiology. The session organizer is Rebecca Halyard, Professor of Biology, Clayton State College, Morrow, Georgia 30260. She asks those who have an interest in such a session to "make yourselves known as soon as possible so that we can get organized." Send her your name, address, and ideas about teaching anatomy and physiology.
ANCILLARY MATERIALS TEACH STUDENTS TO SWIM

by Jon A. Sperling
Queens College
City University of New York

"Do I have to know that?"
"Will that be on the test?"
"Are we responsible for this whole chapter?"

Since my first day as a teacher some 20 years ago this question, in all its variations, is the one I have most often been asked. This is not the sort of question ever heard by the formidable Professor Kingsfield in his "Paper Chase" law class. But the Ivy League law school is a far cry from the day-to-day reality of teaching in many city, state and private institutions of higher learning across the country. Real students have problems and difficulties never encountered by those who matriculate into Camelot Academy.

Our students come to us with many diverse problems. We recognize the more obvious ones: finances, family disorganization, peer pressure, language barriers, social background, hormones, psychological imbalances and such.

But are we aware of the problems we teachers generate for our students? To the students, the university is like a new world, full of strange countries called Psych 11, Bio 1, Soc 1 and so on. The teachers are like tour guides presenting a seemingly Indigestible amount of facts and scenic areas in a language that is barely intelligible.

To compound the problem, the textbooks which should, ideally, serve the students as Baedeker's through these foreign countries, all too often overwhelm them with "satisfaction input bombing." Hundreds of pages of facts and figures are complemented by a plethora of ancillary materials, including teachers' guides, students' study guides and test files, some maybe even available in software format.

"Do I Have to Know That?"

While this proliferation of ancillary materials certainly provides a wealth of topic input, it seems to me to subvert the purpose for which it was designed, that is, to answer the basic question: Do I have to know that? Instead, it saturates without providing the direction requested.

That basic question can be annoying to most teachers. It is natural to want to respond, "I'm teaching it, and of course you have to know it. Otherwise, I wouldn't bother teaching it!"

But, are we really pandering to mediocrity by answering that question? Quite frankly, many of our students are doing mediocre work, because of one or more of the problems mentioned above. If we say to these students, "Here's the course material, you wade through it, pick out the truly pertinent information, make discriminatory judgment regarding what you need or need not memorize," we are actually saying, "Jump in the water and sink or swim." Too many of these students will sink, straight to the bottom. It is not wrong to offer these students "swimming lessons" at the entry level, to prepare them for the deep water of the advanced level courses.

If the available textbooks, with their expertly and painstakingly prepared ancillary materials, do not provide the basic "swim instruction" our students need, then what will? My solution has been to create my own supplementary booklets, carefully tailored to fit the material I present in class, and clearly outlining what the students in my class need to know. My "targeted input teaching" consists of two separate booklets, which are sold to the students at cost.

One booklet is the Lecture Supplement. It consists of approximately 120 pages of carefully drawn and labeled diagrams which are identical to diagrams and sketches which I present during my lectures, using an overhead projector. There is room in the margins for students to take some notes, though a lecture notebook is still necessary.

The second supplement, the Sample Exam Questions booklet, contains some 800 sample multiple-choice questions. At the beginning of the semester I advise my students that, while the questions in my exams will not be identical to those found in the booklet, studying that booklet will greatly enhance their potential for doing well on the exams. For my sample questions, I select many of those which my students have repeatedly told me are "tricky." The booklet contains only questions, no answers, so I am not "giving the answers away." I am, however, familiarizing my students with the type of questions I ask.

Writing the supplements is not as easy as it might initially appear. It requires a considerable investment of time to prepare the diagrams, write the exam questions, and distill out the most pertinent facts from the prepared lecture. However, it is an investment in time which returns a fair rate of interest.

First, once the drawings are made and prepared for the

Editor's note: This article originally appeared in The Teaching Professor, June/July 1990 (Magna Publications, 2718 Dryden Drive, Madison, WI 53704-3086; 608-246-3580). It is reprinted here with permission of the publisher.
overhead projector, it frees up valuable lecture time which would otherwise have been used for drawing or writing on the chalkboard while the students slowly, and not always accurately, copied what the teacher was writing.

By carefully editing the handouts and having them printed and sold in book form, I not only saved my lecture time, but I also saved the department considerable money. The booklets are sold at cost to the students, at a nominal $5. But when the department was paying for the handouts, at approximately $5 per student, times 250 or more students per semester, the cost certainly wasn’t nominal.

**Bonus: Display Your Teaching Talents**

In addition to saving irreplaceable lecture time, the supplements prove beneficial to the teacher in yet another way. They help answer the teacher’s question, “How do I demonstrate my skill as a teacher?” How, indeed, can a talented instructor make teaching ability evident? The supplements help by providing clear, open and honest ways to show what kinds of material you present in your lecture and, just as important, the manner in which you present that material. They are graphic demonstrations of the day-to-day experience of sitting in your lecture hall.

Teaching the “big course” at City University is not like lecturing in the rarefied air of the Groves of Academe. But it need not be fraught with frustration and exasperation either, nor need the teacher lower expectations to match the abilities of the so-called “lowest common denominator.”

By initially investing the extra time and effort to create a custom-tailored supplement, the teacher can empower the students with a guidebook that bridges the gap between the students’ own background and language, and the language and experiences of the country known as Bio 1. By bridging this gap, both students and teacher benefit.

**EMPLOYMENT OPPORTUNITIES**

As an added benefit of HAPS membership, the newsletter now includes a want ads section that will encompass positions wanted, positions available, and faculty exchanges. If you or your department wish to use this service, send the basic information to the editor. Include name, address, telephone number, date of availability, degree earned or required, and type of position. Want ads will be published, subject to space availability; the editor reserves the right to shorten descriptions.

**POSITIONS WANTED**

Clinical anatomist with editorial and illustration experience seeks teaching position. Background includes instruction to residents, medical and dental students, physician assistants, nurses, physical and occupational therapists, undergraduate biology students, and ambulance volunteers. Contact: Sharon Colacino, Ph.D., 420-2510 Kenderdine Road, Saskatoon, Saskatchewan, S7N 4E5 Canada.

**POSITIONS AVAILABLE**

Full-time teaching position tentatively to begin September, 1991. Teaching responsibilities include human anatomy and physiology, microbiology and possibly chemistry. For more information, contact Lewis M. Milner, Dean of Health Sciences, North Central Technical College, P.O. Box 698, Mansfield, OH 44901-0698.
In the literature
by Wayne Carley
Department of Biology, Lamar University, Beaumont, Texas 77710

How or Why?
As scientists, we take for granted a mechanistic view of the world and struggle to maintain objectivity in our work. Our students are not so rigorous in their thinking. In a recent study at the University of Kentucky, Daniel Richardson examined students' notions of body function to determine the extent of teleological thinking. Teleology is a way of thinking that considers purpose sufficient to elicit a response. An example is "My car starts in the morning because I need to get to class on time." (not because I have it tuned regularly). Richardson asked several groups of students at three levels -- high school biology, beginning level college physiology, and advanced college physiology -- to complete ten statements by selecting from a choice of answers. A remarkable 61% of the responses were teleological. Even more remarkable -- and disturbing -- there was no difference among the groups! Advanced physiology students still confuse purpose with mechanism. Fortunately, there is hope. Specific training in thinking skills significantly reduced the rate of teleological responses in follow-up testing.

Reference:

Fall into the Gap (Junction)
Often in scientific controversies, both sides eventually are proved correct. Such is the case in our understanding of transmission between nerve cells. Although J. C. Eccles believed fervently in electro-neurotransmission, he himself provided the definitive experiments to verify Otto Loewi's theory of chemical transmission across synapses. Within a few years after Eccles's Nobel Prize-winning work, though, others did find electrical transmission in the nervous system. Today, we are familiar with good examples of both types of transmission. In our efforts to explain to our students the complex nature of chemical transmission at the neuromuscular junction, we often overlook the interesting and important electrical synapses -- and the gap junctions that form them.

In a recent issue of Mosaic, Edward Edelson brings us up to date on the nearly ubiquitous gap junction. Gap junctions form patches of direct communication between cells that allow the ions carrying electrical current to pass from one cell to the next without the delays of chemical neurotransmission. Electrical synapses are found in pathways such as the giant fiber systems involved in escape responses. Although we know that gap junctions are composed of clusters of six proteins called connexins, the mechanisms by which they open and close to regulate transmission is still hotly debated.

F. E. Dudek's group at UCLA is looking into the possible role of gap junctions in the synchronized but uncontrolled neural discharges of epilepsy. In other tissues gap junctions are being examined for their metabolic cooperation, which can allow an intact cell to keep the machinery of a defective cell going. Gap junctions may also play a role in cancer, as they normally allow intercellular communication that may prevent malignant cell growth. The oncogene ras is known to act on gap junctions.

Reference:
Edelson, E. 1990. Conduits for Cell/Cell Communication. Mosaic 21(2):48-56. (Published by the National Science Foundation.)

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. Deadlines for submission of materials are: February 1 for the May issue, June 15 for the September issue, September 15 for the December issue, and December 1 for the February issue.
**Lab Idea**

**Locomotion in Snakes**
by Steven Trautwein

Here is an idea for a lab activity that can be used as an integrating exercise for the principles of neuromuscular coordination and sensory feedback. A pre-demonstration discussion primes the students to think about the constraints of limbless locomotion. A short presentation familiarizes them with the four methods of snake locomotion: lateral undulation, concertina progression, rectilinear motion, and sidewinding. This presentation ends with the assignment to complete the statement: "It must be difficult moving like a snake because..."

After the demonstration of snake locomotion (which I do with live snakes, but I suspect could be viewed by commercial video tape), the class as a whole generates its answers to the above question. Examples: "...a snake must coordinate the movement of its segments...cooperation of all the effectors (skeletal muscles) is multiple and complex...most of the locomotive activity relies on surface irregularities."

Following this discussion, I announce to them that this exercise will be on the final exam. They can choose any one of the statements generated in class and will be asked to do the following:

Suggest and describe a physiological mechanism that would solve this problem. This suggestion need not be correct. The criteria for judging answers are as follows: (a) Does the answer really address the problem you have chosen? (b) Is your answer consistent with known physiological principles? (c) Is your answer written in mechanistic, rather than teleological, terms?

This exercise provides an opportunity for the students to take the principles of neuromuscular physiology and apply them to a real situation that they have observed themselves. Also, it empowers the students by having them write part of the examination. I will be glad to supply more details to any interested HAPS members.

[Editor's note: You can find Steve's address in the corner box. Why not send him a swap idea when you write to ask for more details of his snake lab?]
PSYCHONEURO-IMMUNOLOGY

by Dr. Leonard Wisneski
Clinical Professor of Medicine,
George Washington University
Medical Center

Approximately 500 scientists around the world are now working in a new field of medicine termed psychoneuroimmunology, which examines how our thoughts and emotions interconnect with physiologic processes. This field emphasizes the relationship of people with their environment and strives to uncover the factors needed to achieve a life of optimal vitality.

With the knowledge that neurons may produce more than one neurotransmitter, that the brain contains well over fifty of these chemical messengers, and that hormones such as insulin, glucagon, and human chorionic gonadotropin are found in the brain, our classical thinking of the nervous and endocrine systems is breaking down. We need to think of the brain as a polypharmacy and study what circumstances will cause specific neurohormonal profiles to occur. A possible scenario of events would begin with a thought arising in the cortex, followed by the production of cortical neuropeptides with receptors in the limbic system, followed by hypothalamic or pituitary responses.

We now know that the thymus gland receives direct innervation from the sympathetic nervous system. In addition, it is speculated that cells of the mononuclear phagocyte network may be roaming messenger cells, passing information from one body system to another. The cytokine interleukin-1 induces slow-wave sleep, fever, bone resorption, and ACTH release. This endocrine-immune interaction is the first example of a cross feedback loop. Neuropeptide receptors have been identified on lymphocytes for endorphins, somatostatin, substance P, VIP, and other hormones. Lymphocytes are also capable of producing hormones such as TRH, growth hormone, and somatostatin. This information is revolutionizing the field of physiology and is changing our thinking regarding the interrelationships of body systems.

"The stress response creates a relative immune depletion. In our hectic culture, it appears that more and more people are incapable of living a balanced life style."

Without biofeedback or deep relaxation techniques, "we are out of touch with our physiological responses." If we have relative immune depletion due to stress, air pollution, smoking, and poor diets, then more illnesses such as chronic fatigue syndrome will begin to manifest themselves. Several studies have shown relative immune depletion in students placed in rigorous professional programs. The more competitive a student is, the more immune depletion that occurs.

Relaxation medicine is a new branch of behavioral medicine that deals with the physiological state of relaxation and treatment techniques that induce this state. Active techniques such as biofeedback, self-hypnosis, meditation, and guided imagery get people to a state of deep alpha rhythm, a state that appears to result in immuno-enhancement.

Benzodiazepine receptors, for drugs such as Valium and Librium, have been identified in the brain. Perhaps we have an unknown, endogenous family of relaxation hormones that can change EEG patterns, induce immuno-enhancement, and inhibit platelet aggregation. Melatonin from the pineal gland appears to be one of these endogenous ligands.

Approaches to medicine change over the years. In the past it was holism, presently it is high-tech, perhaps in the future it will be high-tech holism. In Dr. Wisneski's view, we need to remember that "health is the outer reflection of inner peace."

--reported by Bob Anthony
Triton College

Anyone wishing a copy of the full transcript of this talk may send a self-addressed envelope to: Bob Anthony, Triton College, 2000 Fifth Ave., River Grove, IL 60171.
WORKSHOPS

LITHOTRIPSY

Drs. Eberhard Mack and Franklin Smith provided an interesting mini-course at the University of Wisconsin Hospitals Lithotripsy unit. A lithotripter uses focused shock waves to fragment kidney stones or gallstones. First approved by the FDA in late 1984, there are now about 120 units (cost: $1-2 million each) across the country. They are being used to blast kidney stones into fragments small enough to wash out in the urine.

The patient is anesthetized (in part because the procedure could be painful) before being precisely positioned in a tub of water. Discharge of an electric spark in the bottom of the tank produces hydraulic shock waves that are focused by a hemispherical reflector. Typically, the treatment consists of multitudes of shock waves, applied over 45 minutes to an hour. The timing of the shocks is coupled to the ECG to avoid the susceptible interval of each heartbeat.

The University of Wisconsin Hospitals are a testing site for a new type of lithotripter that offers several advantages. Dr. Franklin said that the older units are like "sledge hammers" while the newer design resembles a fine "ball-peen hammer." In the newer design, the water bath is not needed, the patient does not receive general anesthesia, and ECG coupling is not needed.

Also in progress at Wisconsin are trials to test the effectiveness of lithotripsy for treating gallstones. Dr. Mack mentioned that every year 700,000 to 800,000 people in the U.S. have their gallbladder removed. A main advantage of lithotripsy over surgery for both kidney stones and gallstones is the quick recovery period. Surgery necessitates a hospital stay of several days, while lithotripsy is done in some centers on an out-patient basis. The cost saving is significant, and people are able to return to work much more quickly.

--reported by Sandy Grabowski
Purdue University

CAT SCAN/ MRI LABS

The CAT scan/MRI workshop provided an opportunity for observation of two non-invasive methods that allow examination of internal body features. CAT scans (computerized axial tomography), used to examine both soft tissue and bone, involve a series of cross-sectional x-rays, stacked one on top of another. The strong plane of this instrument is axial, and it is sometimes used with a contrast medium.

In Magnetic Resonance Imaging (MRI), formerly called Nuclear Magnetic Resonance (NMR), the patient lies on a table in the center of a large magnet. A magnetic field produced either by a cryogenic magnet or an electromagnet is used to line up nuclei, often hydrogen nuclei. These are then "bent" by a radio frequency wave. When the radio wave is turned off, the nuclei line back up, producing a measurable electric field.

This very expensive piece of equipment (cost: about $1.5 million) produces impressive images that are as distinct as cadaver sections. MRI is equally effective for examination on any anatomical plane. It is currently contraindicated for pregnant females, people who have pacemakers, and people with moveable metal within their bodies (such as a blood vessel clip that might move in the magnetic field and produce bleeding).

--reported by Mary Losi

SWAP SESSION

Try, Try Again
by Lew Milner
North Central Technical College
Mansfield, OH 44901

In lab I require students to attempt lab quizzes a second time if their first grade is lower than a C. The second attempt quiz is given the following week, and the grade is reduced by 10% on the second attempt. This system has several advantages. It helps to reduce stress during the first attempt, motivate students to still master material if they failed the first attempt, and identify weak or marginal students early in the term. Since the quizzes occur every two weeks, they force students to keep up with the lab material, which then gives them an edge in lecture.
1991 HAPS CONFERENCE AND WORKSHOPS

GREENVILLE, SOUTH CAROLINA

CONFERENCE HOTEL: HYATT REGENCY

For information, write to:
Karen LaFleur
Greenville Technical College
Box 5616 Station B
Greenville, SC 29606

Tentative Program

SATURDAY MAY 25 - (afternoon and evening) REGISTRATION, PERUSE EXHIBITS, SOCIALIZE

SUNDAY MAY 26 - HAPS BUSINESS MEETING, ETHICAL ISSUES IN BIOLOGY, PSYCHONEUROIMMUNOLOGY OF AIDS, OPHTHALMOLOGY UPDATE

MONDAY MAY 27 - HUMAN MOLECULAR GENETICS, THE ALTERED BRAIN, REPRODUCTIVE PHYSIOLOGY, UPDATE: THE MEDICAL ARTIST, BANQUET

TUESDAY MAY 28 - GRANTSMANSHIP, EXERCISE PHYSIOLOGY, PHYSIOLOGY ON THE MACINTOSH, HAZARDOUS BIOLOGICAL MATERIALS & OSHA, PICNIC SUPPER BY FURMAN LAKE

WEDNESDAY MAY 29 - TEST DESIGN AND WRITING, EFFECTIVE LECTURE TECHNIQUES, SELF-MADE, INEXPENSIVE DIGITAL STORAGE SCOPE, TOURS, THEATER

THURSDAY MAY 30 - TEACHING CRITICAL THINKING IN BIOLOGY, STAYING CURRENT IN A&P, NEW TEACHING STRATEGIES IN A&P, RECENT ADVANCES IN COMPUTER SOFTWARE

Delta Airlines is offering discounts to HAPS Conference attendees. Call Delta at 1-800-221-1212 and ask for the Special Meetings Network, file ref. number J23084.

Dr. Sandra R. Grabowski, Editor
HAPS News
Department of Biological Sciences
Purdue University
West Lafayette, IN 47907

FIRST CLASS MAIL
**CANDIDATE INFORMATION FOR**
**THE HUMAN ANATOMY AND PHYSIOLOGY SOCIETY**
**OFFICERS AND APPOINTED COMMITTEE MEMBERS, 1991-1992**

**Name** ___________________________________________ **Title** __________________________

**Highest degree:**  ____ B.A/B.S.  ____ M.A./M.S.  ____ Ph.D.  ____ M.D.

**Business Address:**  

<table>
<thead>
<tr>
<th>Department</th>
<th>College</th>
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<tbody>
<tr>
<td>Street</td>
<td>City</td>
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</table>

**Home Address:**  

| Street | City | State | Zip code |

**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.)** ____________________________

If you would like to give a statement of your goals or interest concerning our Society, please use the back of this sheet.

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

| ____ President Elect | ____ Secretary-Treasurer | ____ Member-At-Large |

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

| ____ Membership Committee | ____ Annual Conference Committee |
| ____ Nominating Committee | ____ Corporate Members Committee |
| ____ Editorial Board of Newsletter (will review articles and contribute pieces in areas of interest) |

**MAIL BY MARCH 1, 1991 TO:**

Virginia Rivers  
Science Department  
Truckee Meadows Community College  
7000 Dandini Boulevard  
Reno, NV 89512