HST in perspective

A newsletter of the Harvard-MIT Division of Health Sciences and Technology

Fall 1988

FOUR NEW HST COURSES

Genetics and Molecular Medicine -- HST-180

This new course will be taught by Drs. Richard Erby, Nancy Hopkins, David Houseman and Eric Lander with the assistance of guest faculty. The course aims to familiarize the student in a quantitative manner with the fundamental concepts of human genetics, including molecular genetics, cytogenetics, formal and population genetics, and clinical genetics. Aspects to be emphasized include the structure, organization and regulation of genes; the chromosomal *(Continued on P. 9)*

Introduction to Patient Care and the Profession that Cares -- HST-220

Along with many other curricular changes at Harvard Medical School the informal first year tutorial program has been sun-downed, and replaced by a series of doctor-patient courses with a more formal structure and requirements. The HST Division has responded by inviting the Medical Department at MIT to develop a similar course as an elective offering.

The Medical Department responded enthusiastically to this request. After a small committee *(Continued on P. 9)*

Honors and Awards

DR. ABBAS RECIPIENT OF LONDON TEACHING AWARD

Dr. Abul K. Abbas, director of HST-175, "Cellular and Molecular Immunology", is the 1988 recipient of the Irving M. London Teaching Award, bestowed by student ballot and a student selection committee on the HST faculty member whose teaching "best exemplifies the goals and philosophy of the Harvard-M.I.T. Division of Health Sciences and Technology."

The Irving M. London Teaching Award was established in 1986 to recognize excellence and dedication to teaching in the biomedical sciences curriculum. HST students may nominate the faculty member they feel makes the greatest contribu- *(Continued on P. 11)*

Dr. Abbas accepts the award from HST-MD student Stanley Shaw

SECOND ANNUAL HST FORUM

The 1988 HST Forum was held on October 28 with approximately 150 students and faculty attending the one day event.

Over 40 papers, representing student research from the M.D., Ph.D., and M.D.-Ph.D. Programs were given as platform presentations or posters during the day. The scientific sessions were held in the auditorium of the Whitehead Institute and in the Thorn-Sizer rooms of the Whitaker College at MIT.

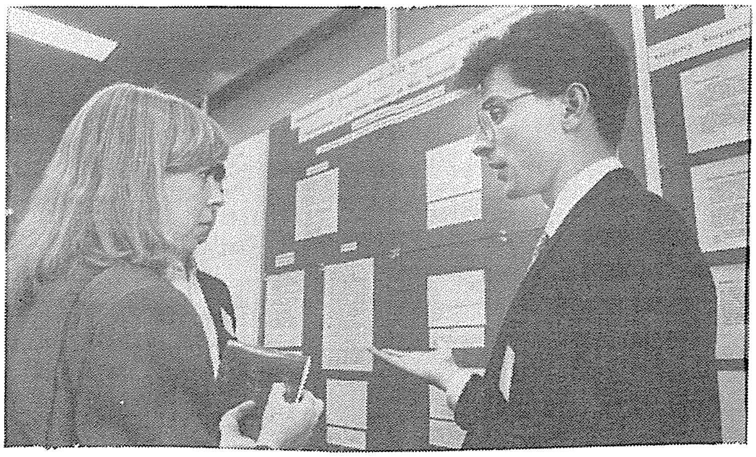
The fields of research represented included engineering sciences, basic sciences, and clinical sciences. Aside from the opening remarks by Dr. Roger Mark, Co-Director of the HST Division, the entire day's events were directed by HST students. All HST classes were cancelled for the day to permit maximal participation by both students and faculty. Ten platform papers were delivered and over 30 posters were presented during the luncheon period. One of the goals of this format is to permit both HST students and faculty representing diverse research fields to become familiar with work underway in other fields.

The scientific session ended with a 90 minute panel discussion centering on the topic "**The HST Experience: It's Too Bad There Are Only 24 Hours In A Day!**" The panel participants included Daniel Federman, M.D., (Dean of Students, Harvard Medical School); Julius Silberger, M.D. (Psychiatrist, Health Services, Harvard University); Maria Alexander-Bridges, M.D., Ph.D. (Assistant Professor of Medicine, Harvard Medical School and Clinical Assistant, Massachusetts General Hospital; HST Graduate); Lee Gehrke, Ph.D., Assistant Professor of HST and Anatomy, HMS); and Peter Jenney, M.D. (Associate Psychiatrist-in-chief, MIT Medical Department). The purpose of the panel discussion was to address the potential problem that HST students have in attempting to over-achieve in an environment which presents an overwhelming number of opportunities. Participation by a large audience of both students and faculty was vigorous, and it was especially important to hear remarks by Dr. Alexander-Bridges who is not only an HST graduate but is now a junior faculty member who is balancing career and family decisions.

The forum closed with an evening dinner dance which featured the presentation of the Irving M. London teaching award to Professor Abul Abbas. Approximately 175 students and faculty attended the dinner which culminated in dancing at the MIT Faculty Club.

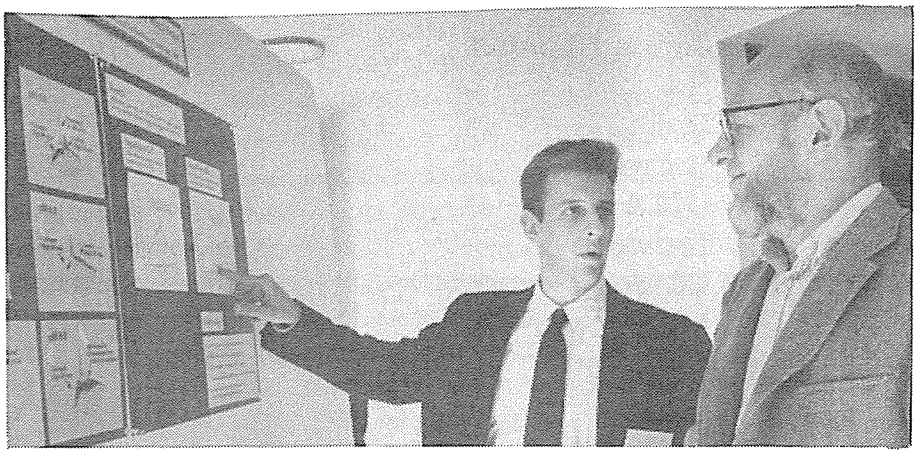
The HST Division is grateful for the support of the Forum which was provided by Monsanto Company; Squibb Corporation; The Upjohn Company; Burroughs Wellcome Company; Miles, Incorporated/Bayer AG; ICN Pharmaceuticals, Incorporated; Reed and Carnrick Pharmaceuticals, Incorporated; Marion Laboratories, Incorporated; and Merck and Sharp Dohme Research Laboratories.

The abstracts for the 1988 Forum are available in booklet form in E25-510 MIT, and short papers describing all of the work presented at the forum will be published in formal conference proceedings, in the early spring of 1989.



1988 HST FORUM

October 28, 1988



HST MD CLASS OF 1992

Thirty students have been accepted into the HST M.D. Class of 1992. The class includes two Rhodes Scholars and six Ph.D.'s. The members of the new class, their undergraduate institutions, and majors, are identified below. All candidates, regardless of undergraduate major, have strong credentials in the quantitative sciences and mathematics, as assessed by the Admissions Committee. The Admissions Committee was chaired by Dr. William S. Beck, Professor of Medicine, Harvard Medical School.

NAME	INSTITUTION	DEGREE/FIELD
Badizadegan, Kamran	MIT	Chemical Engineering
Cameron, Scott	Johns Hopkins	Chem/Genetics
Chan, David	Harvard	Biochemistry
de la Torre, Ralph	Duke	Biomech Eng
Frucht, Steven	Harvard	Biochemistry
Graham, Scot	UCLA	Kinesiology
Griesman, Harvey	Harvard	Chemistry/Physics
Hu, Kenneth	UCLA	Mol Cel Dev Biol
Huang, George	MIT	Biology
Johnston, Sterling	Amherst	Physics
Kosman, Richard	Harvard	Chemistry
Kusumi, Kenro	Harvard	Biochemistry
Lai, Amy	Harvard	Biochemistry
Lee, Vivian	Harvard	Biochemistry
Li, Vincent	Harvard	Biology/VES
Malek, Adel*	MIT	Electrical Engineering
Mazzoni, Pietro	UCSD	Biophysics/Premed
Morse, Nicholas	Swarthmore	Psychobiology
Murakawa, George	UCLA	Microbiology
Nguyen, Ben	Harvard	Biochemistry
Pu, William	Yale	Mol Biophys/Biochem
Rago, Oscar	CUNY	Biochemistry
Roth, Heidi	Harvard	Biology
Rybicki, Frank	U Penn	Mathematics
Stultz, Collin	Harvard	Math/Philosophy
Tong, Lucene	MIT	Electrical Eng
Tsao, Jack	Harvard	Biochemistry
Van Nice, Faith	MIT	Chemistry
Weaver, Yaffa	Duke	Biomedical Eng
Wu, George	Harvard	Chemistry
Yang, Michael	Johns Hopkins	Biomedical Eng

** Admitted last year, but officially assigned to 1992.*

DR. FEDERICO WELSCH NEW ASSOCIATE DIRECTOR OF NCI

Dr. Federico Welsch, M.D., D.Med.Sc., Ph.D., has been named Associate Director of the National Cancer Institute for International Affairs. Welsch will head the Institute's international cancer science activities.

Before accepting the NCI position, Dr. Welsch was executive officer to the Committee on Research Development at HST. For the past 10 years, he has also prepared budget analyses and recommendations for the U.S. Congress' Delegation for Basic Biomedical Research.

The HST Research Development Committee identifies, initiates, organizes and supports the development of new inter-university, interdisciplinary research programs involving faculty and staff of MIT, Harvard, and the affiliated hospitals. The goals of these new collaborative research initiatives should be solutions of important medical problems in which interdisciplinary research promises greater probability of accomplishment than research programs based on single disciplines, and where the combined resources of Harvard and MIT might be brought to bear productively.

New Faculty

POON, ICHIMARU, YU ACCEPT VISITING APPOINTMENTS

Dr. Chi-Sang Poon will be a Visiting Associate Professor in HST for the academic year 1988-89. Dr. Poon, who is on leave from the Department of Electrical Engineering at North Dakota State University, is widely known for his provocative studies on the control of respiration during exercise. His engineering expertise covers the areas of signal processing and optimal control theory. He has actively pursued these interests in the area of biomedical engineering, with a particular interest in respiratory physiology. He has not only proposed new ideas in optimal control modeling of the respiratory control system, but has also developed practical instrumentation systems for use in artificial ventilation. Dr. Poon will join other HST Colleagues in the Biomedical Engineering Center where he will continue his active research program. In addition, he will be offering a graduate seminar course on the subject of biological control systems during the Spring semester 1989.

Dr. Yahui Ichimaru will be joining HST as a Visiting Assistant Professor beginning in the late Fall 1988. Dr. Ichimaru is a practicing internist with a special interest in cardiovascular and pulmonary disease. However, most of his efforts in recent years have been devoted to the study of biorhythms. He is particularly interested in heart rate regulation during the sleep/wake cycle.

Dr. Ichimaru holds a faculty position in the Department of Bioclimatology of the Medical Institute of Bioregulation, at Kyushu University in Japan. His active and broad-based scientific career has taken him to the Antarctic, where from 1974-1976 he actively studied bacteriological pollution in the Antarctic area and the physiological characteristics of the bacteria collected. Dr. Ichimaru will work in close collaboration with Dr. Richard Cohen and Dr. Roger Mark, and will also spend considerable time in the Cardiology Division of Beth Israel Hospital.

(See **BEVERLY YU**, *P. 11)*

SEPTEMBER 1988 MEMP CLASS

Ten new graduate students from a wide range of undergraduate institutions joined the HST Medical Engineering/Medical Physics Program (MEMP) in September 1988. All MEMP students are admitted jointly by HST and a Department of Engineering at MIT or by the Division of Applied Sciences of the Graduate School of Arts and Sciences (GSAS) at Harvard. There are presently 50 graduate students in the MEMP program.

NAME	INSTITUTION	DEGREE/FIELD
Boustany, Nada	MIT	Mech Engineering
Davis, Timothy (also HST MD)	Indiana University	Elec Eng & Comp Sci
Fine, Bernard	U Montreal	Physics
Greenberg, Julie	U Michigan	Elec Eng & Comp Sci
Lee, Brian	Queen's U, Kinsgston, Can	Elec Eng & Comp Sci
Loree, Howard	MIT	Mech Engineering
Sidney, Daniel	Yale	Mech Engineering
Sodickson, Daniel	Yale	Physics
Tong, Lucene (also HST MD)	MIT	Elec Eng & Comp Sci
Woolfson, Steven	MIT	Mech Engineering

HST ADVISORY COMMITTEE REPORT

The HST Advisory Committee visited HST in March 1988. This Committee, composed of fifteen distinguished individuals from government, academia and industry, were assembled to function as the Division's "Visiting Committee." They will visit the Division periodically, at approximately 1-1/2 to 2 year intervals in order to provide independent assessment of our educational and research programs, and to offer advice which will be useful in long range planning.

The initial visit in March focused principally on the educational programs of HST. The report of the Advisory Committee, submitted to Dean Tosteson of Harvard Medical School and Provost Deutsch at MIT was made public in the late summer. The report was strongly supportive of the existing programs of HST. Several constructive suggestions were offered. The HST administration was encouraged to seek ways to interact more closely with biology faculty at MIT to bolster the introduction of modern molecular biology into the HST/MD courses. The Committee also suggested that HST give serious consideration to adding strength in the area of Biomedical Imaging. The Advisory Committee further suggested that HST study the possibility of launching new educational programs at the interface of engineering and the physical sciences with modern biology and biotechnology. The Advisory Committee report has been distributed to the faculty, and is under intensive discussion in various faculty committees.

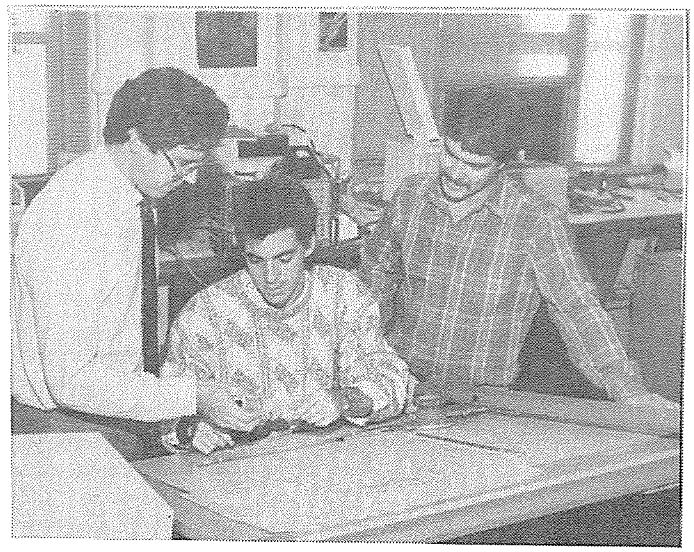
MGH Biomedical Engineering Department News

Design and Development Group

The Department of Biomedical Engineering has many responsibilities in the areas of clinical service, research, and education. In order to meet these responsibilities, the department is organized into six separate groups which work together in a collaborative fashion. Of these groups, the Design and Development Group answers the need for one-of-a-kind instruments or devices, which are not available commercially, to solve specific clinical problems. This group also designs and fabricates specialized instruments or data-acquisition systems to help researchers pursue their goals.

The group, which is comprised of five engineers and technicians who have special expertise in the aforementioned areas, is headed by Alan Shapiro who has more than twenty years of experience in the development and manufacture of medical electronic products. Shapiro is aided in this effort by Larry Aube, an electronic design engineer; Luis Melendez, a mechanical design engineer; Andrew Wieckiewicz, a software engineer; and David Wrightson, a research technician. Together they form a design and development team of considerable talent that has become an important engineering resource in both the clinical and the research communities of the hospital.

As an example of their work, the Occupational Therapy Department of the hospital needed a device to replace the hydrocollators they had been using to heat and shape plastic splints because these devices had become an infection hazard. Engineer Luis Melendez and



(l to r) Larry Aube, Paul Cheney, and Dave Wrightson are part of the Design and Development Group at MGH

technician David Wrightson designed and built a portable electrical heater that met the needs of Occupational Therapy and simultaneously solved the infection control problem. The device has been so successful that the Design and Development Group is now fabricating four more units for use in the hospital.

As a further example of the work of the Design and Development Group, Dr. Burt Zarins and his research fellows in Sports Medicine needed a data acquisition system to aid them in their studies of knee-ligament stress. Engineer Larry Aube designed a system based on a personal computer that not only stores the data but also significantly reduces the amount of calculation time previously required. In addition, David Wrightson fabricates the miniature strain gauges that are used to transduce the strain for the data acquisition system.

Frequently, the Design and Development Group works with HST faculty and students in their research. For example, Larry Aube has built a special catheter that senses bladder pressure and local flow in the *(Continued on P. 11)*

JOHNSON & JOHNSON FUND PROPOSALS SOUGHT

Through the generosity of the Johnson and Johnson Company a fund has been established in the Division of Health Sciences and Technology to foster interdisciplinary health related research at MIT and at Harvard. The program is now in its second year, and will disburse annually a total of $200,000: $100,000 to eligible faculty at each of the two institutions. A major goal of the HST Division is to encourage innovative health related research. In addition, the Division wishes to stimulate student involvement in active research programs. With these objectives in mind, the following guidelines have been developed to govern the distribution of the research funds.

Proposals may be submitted by **faculty members** at MIT or Harvard University for research which involves an HST M.D. or Ph.D. student (regardless of the source of the student's support). Faculty may hold appointments in any of the schools of MIT, and any of the faculties at Harvard University, including the teaching hospitals.

Proposals for research which involve a **full-time** HST student research assistant may request funds up to a maximum of $20K per year (including indirect charge if not waived by the investigator's institution). A maximum of $10K is available for research proposals which involve a **half-time** student research assistant. Funds are intended to support stipends, tuition supplementation, supplies, equipment and travel. Assistance with budget development may be obtained from HST's Administrative Officer, Ms. Keiko F. Oh, (253-1445).

Proposals are limited to a total of **four pages**. The objectives, significance, and methods to be used in the proposed research should be clearly and succinctly stated, and may include preliminary data and/or calculations. The identity and role of the HST Research Assistant should be defined. A separate page should be used for the budget and its justification. Curriculum Vita (limited to two pages) should be included for the faculty investigator(s) and the student research assistant. Renewal applications should include a succinct report of progress during previously funded work.

The completed proposal should be approved by the relevant Department Head(s) and institutional officers. It should be sent to Johnson & Johnson HST Research Fund, E25-519, MIT, Cambridge, MA 02139.

Proposals must be received by January 15, 1989. Awards will be announced by April 15, 1989, and funding will be available beginning July 1, 1989.

PARTY!

On Monday, January 9, 1989, the HST Division pays homage to the season with its annual holiday party. Festivities begin at 3:00 PM in E25-117 MIT. Tantalizing treats will be available at the holiday buffet.

AND AGAIN!!

All HST faculty and students are invited to the HST skating party, 10:30 P.M. to 12:30 A.M. on Saturday, January 14, 1989. Come and bring a guest to the MIT ice skating rink, first floor of the Howard Johnson Athletic Center, for a really cool event!

HST-220 *(Continued)*
(that included a third year HST student and the course head of the Introduction to the Clinic second year offering) met and laid out a once a week 2-hour program, we invited participation by HST first year students. At this time, 7 members of the Class of 1992 are enrolled and involved.

We've named the course, in addition to HST- 220, "Introduction to Patient Care and the Profession that Cares."

Individual students sit in and listen while primary care doctors see their patients. Others talk with patients in our Inpatient Unit. A wrap-up meeting occurs at the end of the morning- individually in the office setting and as a group with an internist and staff psychiatrist in the Inpatient arena. Some history taking and physical exam demonstration is done selectively but this isn't a physical diagnosis or history taking course.

Every 4-5 weeks the entire group of 7 meets to hear about and discuss a topic of more general impact and interest in the health care arena. One of these conferences revolved around patients with treated malignancies, where treatment left the individuals more vulnerable to infection. Another addressed caring for chronically ill patients and utilizing home care programs to deliver appropriate treatment. The high cost of technology was discussed in late October; this topic was introduced via presentation of a patient with an infertility problem requiring special studies and multiple specialists.

Our MIT Medical Department effort has been organized by Dr. John M. Moses, who is an Assistant Clinical Professor of Medicine at HMS. Drs. Michael Kane, Chris Kryder, Peter Jenney, Margaret Ross, Eric Chivian, and other psychiatrists, primary care internists, surgeons, pediatricians, nurse practitioners, physician assistants, and administrators have also been involved. We've been impressed with the interest, sensitivity, and involvement of the HST students. The Medical Department staff has been excited about participating in the course and most patients are very accepting and cooperative to talk with students.

We're confident that we can modify and improve this introduction to patients, doctors, and the health profession. If there is a groundswell of enthusiasm we might be able to offer this course again in the Spring Semester for those who couldn't fit it into their Fall schedule. And we'll be interested in your ideas and constructive criticism.

Arnold N. Weinberg, M.D.

(Ed. Note: For more new course information, please see the following page)

HST-180 *(Continued)*
arrangement of genes; the nature and extent of mutations; factors influencing the expression of mutation; the impact of mutations on the individual and the population; the usefulness of human genetic disorders for the study of basic genetic mechanisms; and societal and ethical issues in genetics.

The course will consist of lectures, seminars, clinics, student presentations, textbook and supplementary readings, problems, and special laboratory and computer activities. In the lectures, the faculty will discuss the basic principles and concepts of human genetics. Weekly clinics will provide an opportunity for students to share the experiences and feelings of patients having a variety of serious genetic disorders. Investigators at the forefront of genetic research will present special seminars. Students will be asked early in the *(Continued on P. 10)*

HST-180 *(Continued)*
course to identify an area of their own special interests to investigate during the month and present later in the course. Such areas may include both basic and clinical topics. Information about a large number of mendelian phenotypes and disorders will be available from a computer registry called Mendelian Inheritance in Man On-line. Students will also have the opportunity to visit genetic research and/or diagnostic (cytogenetics, prenatal, newborn screening and molecular) laboratories if desired.

The textbooks for the course will be Clinical Genetics and Genetic Counselling by T.E. Aelly (2nd ed. Year Book Medical Publishers, 1986) and The New Genetics and Clinical Practice by D.J. Weatherall (2nd ed. Oxford University Press, 1985.)

The course is open to all qualified students in the Harvard and MIT communities, as well as to HST students; it begins on Wednesday Jan. 4, 1989 and ends on Monday, Jan. 30, with a written final examination on Jan. 31.

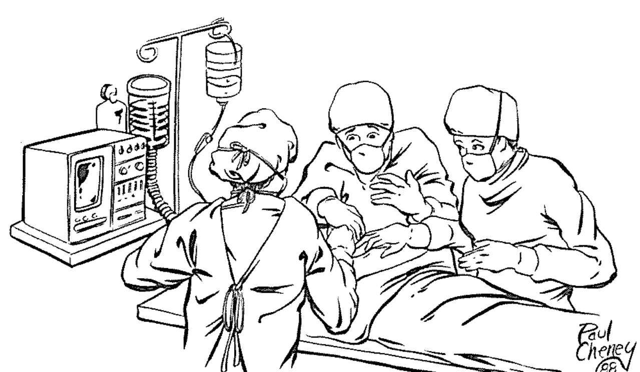
BIOLOGICAL CONTROL SYSTEMS

Professor Chi-Sang Poon, visiting Associate Professor in HST from the Department of Electrical Engineering at North Dakota State University, has developed a new course for the spring entitled "Biological Control Systems." The course is designed to introduce students to the wide range of control mechanisms inherent in the human body and to equip them with some general systems-theoretic techniques for the modeling and analysis of these systems. A wide variety of systems ranging from molecular to ecological levels will be covered, with emphasis on both the underlying physiology and engineering principles involved.

Selected course topics include: compartmental analysis and system identification; blood glucose regulation; control of respiration and blood pressure; mathematical models of genetic regulation; population genetics and epidemics models; and neural network models.

PRINCIPLES OF SUCCESSFUL GRANTSMANSHIP

HST is planning to offer a course which will deal with the principles of successful granstmanship starting in January and extending through the spring of 1989. The course offering is dependent on sufficient enrollment. The course will deal with the mechanics of acquiring research support through grants, and will cover aspects of writing as well. The course, open to all HST students, will include a mini-proposal written as a grant application. The students will also participate in all the steps of the regular grant peer review, study section, Council approval process. Course leaders will be Dr. H. Fred Bowman and Dr. Federico Welsch, presently Associate Director of the National Cancer Institute for International Affairs. For further information please contact Dr. Bowman at 253-7426.



WAIT A MINUTE... THIS LOOKS NOTHING WHATSOEVER LIKE AN RC-CIRCUIT!

ABBAS *(Continued)*

tion to the furtherance of the goals of HST; these nominations form a list that then goes before the student selection committee. The committee, moderated by a faculty member and composed of students who have completed HST Biomedical Sciences Courses through Spring of their second year, then bases its selection on the nominations, course reviews, and student evaluations.

Dr. Abbas, a member of the Harvard Medical School Pathology Department since 1977, received a Bachelor of Medicine and Bachelor of Surgery (M.D. equivalent) degree from the All-India Institute of Medical Sciences in New Delhi in 1968. After residency in Pathology at Peter Bent Brigham Hospital in Boston (1970-73) he received postdoctoral training in Immunology at Harvard Medical School and the National Institute for Medical Research in London. Dr. Abbas' HST course in Immunology, initiated in the Fall of 1987, has been called a "first-rate, up-to-date, sophisticated introduction to immunology." Students uniformly praise Dr. Abbas' "thorough knowledge and clear impartation of his subject", his accessibility outside the classroom, and his enthusiasm in delivering his course. He was also commended for the high quality of his portion of HST-030, "Human Pathology". His treatment of immunology in HST-030, in fact, has motivated many HST students to pursue further research in the subject.

Dr. Abbas has done important and ground-breaking research in the establishment of the antigen presenting functions of B lymphocytes and in the role of recently discovered interleukin-4 producing helper T cells in antibody production. He was awarded the Warner-Lambert/Parke-Davis award for meritorious research by a member of the American Association of Pathologists under the age of forty.

Past recipients of the Irving M. London Award include Farish A. Jenkins Jr., 1987, and Walle J.H. Nauta, 1986.

BEVERLY YU *(Continued)*

We are also pleased to welcome **Professor Beverly C. Yu**, who is spending her sabbatical year in the HST Biomedical Engineering Center as a Visiting Scientist. She received her Ph.D. degree in physics from the University of Houston in 1967, and now is Professor of Physics and Director of the Institute of Biomedical Engineering at National Yang-ming Medical College in Taipei, Taiwan. Her major research interests are in biomedical signal processing, including medical image processing, automated diagnosis of electrocardiograms, and detection of fetal ECGs.

MGH *(continued)*

urethra as part of Professor Cravalho's research in the fluid mechanics of the lower urinary tract. Luis Melendez and Andrew Wieckiewicz are designing and building a computer-controlled experimental system to aid Professor Martha Gray and MEMP student Minerva Garcia in their research on the biochemical behavior of chondrocytes under mechanical loading. The group has also designed and fabricated a magnetically based sensing system for Dr. Jose Venegas who is measuring changes in skull geometry of neonates who are artificially ventilated. MEMP student Nada Boustany has worked closely with Alan Shapiro in refining the design. Says Shapiro, "This has been one of the most interesting positions I have ever had. Apparently, we are thought of as fire-fighters so we see a wide variety of projects and people that constantly test our knowledge and experience. But we have a good group, we enjoy what we do, and I think we are equal to almost any challenge." The faculty and students of HST who have had the good fortune to work with this productive group of creative engineers concur wholeheartedly.

Calendar of Events/Deadlines

December 23, 1988	MIT registration material for 2nd semester DUE (both M.D. and MEMP)
January 1, 1989	RA applications DUE for spring term
January 4, 1989	HST January classes begin
January 9, 1989	HST Holiday Party (see P. 8)
January 14, 1989	HST Skating Party (see P. 8)
January 15, 1989	Proposals DUE for the following • Johnson & Johnson Research Fund (see P. 8) • Whitaker Health Sciences Fund Grants to Boston University School of Medicine, Harvard Medical School, and Tufts University School of Medicine Faculty Collaborating with MIT Faculty on Biomedical Research
January 31, 1989	HST January classes end
February 1, 1989	Proposals DUE for the following: • Whitaker Health Sciences Fund M.I.T. and Whitaker College Doctoral Fellowships • Whitaker Health Sciences Fund Harvard-MIT M.D./Ph.D. Fellowships • Whitaker Health Sciences Fund MIT Faculty Research Grants

HST in Perspective is published twice a year by the Harvard-MIT Division of Health Sciences and Technology. News items and editorial comments are welcome.

HST in perspective

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Non-Profit Organization
U.S. Postage PAID
Cambridge, MA
Permit No. 54016

Issue No. 3

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