

IN VIVO

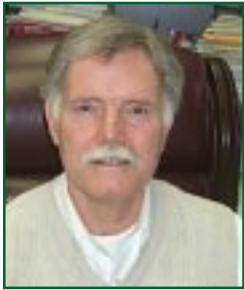
Newsletter of the University of Tennessee Division of Biology

VOLUME 2, NUMBER 1

APRIL - MAY 2002

From the Director

By John Koontz, Ph.D.



Welcome to the beginning of our second year of *In Vivo*. Although your feedback about this newsletter has been limited, it has been very

positive. Since this is the start of our second year I'm going to use this time to reflect on some of the data quantifying our activities.

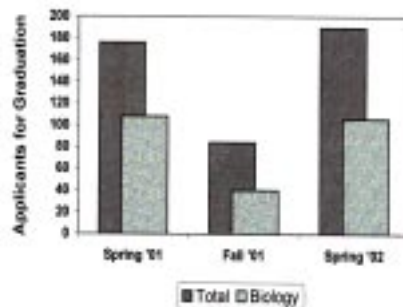
As academics we like to focus on content, the content associated with our research, teaching and service efforts, and not so much on the numbers associated with carrying out those activities. However, it is important to evaluate those numbers as well.

One number I'd like to have a better grasp of is the number of undergraduate biology majors. This is not easy to measure accurately. We have found that most students don't declare their biology major until their junior or sometimes even their senior year. Wording in the undergraduate catalog description detailing grade point average requirements for the prerequisites for the major has led students to believe that they

could not declare the major until they had completed the prerequisites. We are rectifying that.

However, upon becoming Division Director I began tabulating the number of students who apply to graduate in a given semester as an index of the number of majors. I've provided those numbers for Spring '01, Fall '01 and for this spring (Spring '02) in the chart below.

Realizing that all Biology graduates earn a Bachelor of Science degree, I also tabulated the total number of applicants to graduate with a Bachelor of Science in the College of Arts and Sciences. That data is provided for comparison.



As you can see, Biology awards slightly more than half of the BS degrees in our College. The departments or programs that grant students a BS degree include Chemistry, Computer Science, Geology, Mathematics, Physics, Statistics, and several pre-professional programs. While these numbers are not a direct measure of the total number of undergraduate majors, they are a clear reflection of the proportion of students we train as biology majors in relation to the other departments or programs awarding a BS degree in our college.

Another important statistic is the number of student credit hours gener-

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BSF can handle it all

The Biology Service Facility (BSF) provides repair services and product development for the Division of Biology and beyond. According to Manager, **David Pratt**, "last year we received 1,107 requests for electronic, mechanical, or carpentry repairs or development." The Physical Plant on campus does not have an electronic technician or a machine shop and some departments such as Physics and Engineering have in-house operations. Therefore, the rest of the departments on campus rely heavily on the BSF. The staff has the capability to design, construct, install and maintain nearly every form of scientific equipment. It also tackles large-scale projects.

"We are talking with a greenhouse company now to get a cost estimate. It looks like it will be around \$1.2 million dollars. We hope that this could come from either an equipment grant from the NSF or a donation from an alumnus of the University."

Hesler Renovations

BSF has been involved with relocating laboratory equipment and office furniture from the Hesler Biology Building into the Neyland Biology Annex (NBA) and the White Biology Annex (WBA). This move included 18 teaching laboratories, 18 preparation laboratories and collection rooms, eleven offices, two research laboratories and two greenhouses.

The Hesler transformation is a two-phase project that will have the old side

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(west) renovated first to create wet laboratories for research space and the new side (east) will become classrooms. This endeavor should take approximately three years. The only parts of the building that will remain in tact are the exterior walls, floors, and columns. The renovation will also include an enclosed walkway between Hesler and the fourth floor of the Austin Peay building.

The only feature in Hesler not included in the renovation process is the main greenhouse. David said, "We are talking with a greenhouse company now to get a cost estimate. It looks like it will be around \$1.2 million dollars. We hope that this could come from either an equipment grant from the NSF or a donation from an alumnus of the University."

The current structure is 4,600 square feet, but the proposed greenhouse could be 8,500 square feet and not only reach across the back of Hesler, but extend to the west corner and house a two story conservatory. "The conservatory would be great for school groups and campus tours," David said.

Botany Project

Through a generous donation, the Botany department has received property in the Greenbriar area of Gatlinburg that will be revamped into a research station this spring. BSF plans to transform the buildings on the site to a field laboratory and lodging for graduate students. The All Taxa Biodiversity Inventory (ATBI) group also has plans for this space.

New Generator

The Walters Life Sciences Building (WLS) recently received a new 600,000-watt generator. This was greatly needed and will provide the energy necessary to support more outlets in the building for ultra-low freezers, air handlers, and incubators (see picture).

Common Space Improvements

BSF is in the process of replacing all the common space autoclaves in WLS. It has also installed a new cage washer for the animal facility (see "Animal



Putting a new generator to work

Facility"). BSF has requested that the new common room in the renovated Hesler building contain new autoclaves, glass washers, and ice machines. In addition, the common spaces will house a growth facility, cold rooms and dark rooms.

In short, the BSF staff maintains over 500,000 square feet of space and equipment on campus. From large-scale to small, they can handle it all.



GST holds retreat

On March 1, 2002 the Graduate School of Genome Science and Technology (GST) hosted its annual retreat at The Foundry in Knoxville. Applicants to the program were also invited.

The guest speaker was Dr. Michel Desjardins director of the protein separation group at Caprion Proteomics and Associate Professor at the Department of Pathology and Cellular Biology of the Université de Montréal. His research interests include the study of cell membrane proteins, membrane fusion and infectious diseases.

The retreat included poster presentations from 46 faculty and 20 GST students and was attended by over 100 UT and ORNL faculty, staff, and students.

Providing a stimulating opportunity to discuss and review research in GST labs, the retreat also gave thirteen visiting applicants a chance to meet GST faculty and students. Hosted by the current GST students, the applicants spent the weekend visiting the UT campus and Knoxville and learning about the GST program.



Animal Facility

By Sally Fridge, Manager

Within the past year our animal population has grown to fill all but five animal rooms. There are more possibilities for growth as most facilities on campus are full and ours is now the only usable one. It is very exciting that the departments in the Division are hiring new faculty members, as this will mean exciting new projects and the probability of more growth for the facility.

We just recently hired a new animal technician, **Joe Ebuén**. He has great potential as he has a background in biology and is working on a BS in that area.

We are happy to report that we just had a new cagewasher installed. This will help increase caging availability. Future plans are to rebuild the old cagewasher, once the new one is running reliably. Another project underway is to bring computer wiring into all of the animal rooms so that investigators and their staff will be able to have internet access using laptops within their animal rooms.

One of the areas I really enjoy is environmental enrichment. I recently put the guinea pigs in group housing. They had gotten so big that they were almost outgrowing their cages. With the help of BSF, I had a simple, large pen built for them all to live in. We have provided them with tunnels, balls to fill with treats, bedding, and bags and boxes that they can climb into.

They will soon have small Igloo doghouses to hide in, as they will feel safer that way. They love apples, carrots, and timothy hay, but don't like bananas (though they are supposed to) or cabbage. Cleaned, cut pieces are tossed into the pen daily and they get to forage for the treats, allowing them to express their natural behavior. When we have the opportunity, we love to watch them interact. As a "frustrated" animal behaviorist, I find this fascinating and would love to have a faculty member perform a behavioral study that I can

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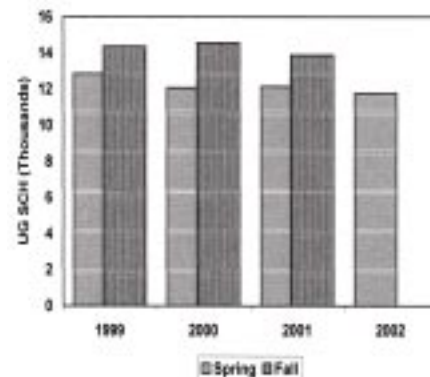
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DIRECTOR, *Continued from page 1*

ated by the various units. The next chart reveals the trend in undergraduate student credit hours generated in Division of Biology courses taught for the past few years. Everyone likes to look at graphs like this and interpret them. I'll offer a few of my own.



We generate more student credit hours in the fall semester than the spring. This trend is consistent for the three years for which I've provided the data. This is simply a function of the capacities of the courses that are taught rather than a significant difference in the number of courses taught. Another trend is a gradual decline in the total number of credit hours generated. While not dramatic, it is noticeable. Two factors affect this.

Remember that I've written several times in past issues about recruiting new faculty this year: eight in fact. These recruiting efforts are to replace faculty who have retired, not to fill additional positions. In order to have sufficient startup funds to recruit new faculty we sometimes have had to postpone a search in order to bank the faculty salary for use in the startup package. Thus a position may remain vacant for at least one year. Consequently, we have had to accommodate this decrease in faculty teaching capacity in our course offerings. Although we have not eliminated critical courses, we have changed the frequency of course offerings.

The second factor that has contributed to this modest decline is a function of the number of graduate teaching assistants. In an earlier issue I wrote

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BCMB

Biochemistry and Cellular and Molecular Biology (BCMB) is currently conducting searches for a professor of genetics and two with interests in structural biology. The search for the geneticist appears to be nearing its end and hopes are that an offer is



forthcoming. The structural biologists have made their final visits and it's time to evaluate the candidates. According to the Department

Head, **Dr. Bruce McKee**, choosing the two structural biologists will be especially difficult.

While they all study various proteins, they use different methods. Two of the candidates determine the structure of a protein by using x-ray crystallography, two use NMR, two do their modeling solely on computers, and the remaining two use biochemical methods. All of the candidates are post-docs and have been questioned extensively on their teaching interests.

It will be a difficult task for the BCMB committee and the faculty from the Center for Structural Biology (CSB) to choose from this diverse pool of candidates. Although the new faculty members will be fully housed in BCMB, their start-up money will come from CSB.

In other news, this will be the first year of an all-inclusive retreat for BCMB. In the past retreats have only been for faculty and have focused on business issues. Dr. McKee said, "we are including faculty, post-docs and graduate students this year. Our topics of discussion will be scientific in order for everyone to get a chance to express their ideas and discuss their research." The retreat will take place May 10-11, 2002 at Fall Creek Falls State Park in middle Tennessee.



Botany

While some departments may lament change, Botany is pleased with its new classroom space in the White Avenue Biology Annex. The location for the Botany teaching laboratories was moved over the summer to accommodate the Hesler Biology Building renovation (see BSF article, page 1) last year.

The Botany Department Head, **Dr. Edward Schilling**, said, "The White Avenue building has space that is well configured for our teaching needs. We have five rooms available to us with a centrally located prep room that has all the equipment we need to prepare for our classes. We also have new teaching greenhouse space for student projects that is adjacent to the classrooms."

Dr. Schilling is also pleased with the plan for research space in Hesler. The current space was designed for Microbiology and Biochemistry laboratories in the 1960's. The new space will be more generic in design so that it can accommodate different research needs. A major advantage related to safety issues is that laboratories will be separate from office space. The department will gain flexibility as well because the laboratories can be reassigned as faculty research programs expand or contract.

Botany is also conducting its 52nd Annual Wildlife Pilgrimage April 22-28 (see www.wildflowerpilgrimage.org). More than half of department's faculty and students take part in this event that is co-sponsored by Botany, the Great Smoky Mountains National Park, the Gatlinburg Garden Club, and the Southern Appalachian Botanical Society. The program this year has been expanded to include a full week of activities, and includes a number of new events.

Even with its laboratory and classroom space in a state of flux, Botany has a full slate of activities and a very positive outlook on the future.



EEB

The search is over and the department of Ecology and Evolutionary Biology (EEB) is proud to announce the addition of two new faculty members. Arriving August 1, 2002 will be **Dr. Aaron King**. He is a theoretical ecologist who received his Ph.D. from the University of Arizona and is currently a post-doctoral fellow at the University of California, Davis. Dr. King is an expert in dynamical systems and has been a member of the flour beetle team who first demonstrated chaos in a laboratory system.

Dr. Thomas Near specializes in systematics and the evolutionary biology of fish, especially the darters. He received his Ph.D. from the University of Illinois and is also post-doctoral fellow at the University of California, Davis. Dr. Near will be joining UT in August of 2003.

A previous hire, **Dr. Marguerite Butler**, will arrive on campus this August. All three of these new faculty members will be the focus of the EEB issue of *In Vivo* this summer.

Established faculty members are as active as ever. **Dr. Gary McCracken**, a population geneticist, travels to Texas to study the Brazilian free-tailed bat. He, and the research group, are featured in April's edition of *The National Geographic*. They are studying the ties between the bat and one of its main food sources, the troublesome corn earworm moth.

Dr. Thomas Hallam will step down as Department Head of EEB this summer.

As a mathematical ecologist, employing quantitative approaches to study ecological systems, he is also



member of the bat research team. He enjoyed his term as head, but looks forward to returning to research and teaching. Therefore this summer's edition of *In Vivo* will introduce three new professors as well as a new department head.

With each opportunity, new faculty members are being added to EEB with the promise that the department will continue to remain one of the strongest programs of its kind in the country.



Microbiology

The department of Microbiology is currently conducting searches for a Virologist and an Immunologist. According to **Dr. Robert Moore**, Department Head, “we are looking for exceptional individuals who will develop not only their own research, but work as team players. Those who will actively participate with other departments or colleges to increase competitiveness of the department and increase opportunities for our graduate students.”



Microbiology’s newest faculty members have established their laboratories and collaborations and are making good progress. **Dr. Pamela Small** is now teaching the Medical Microbiology course and is maintaining her international involvement with the World Health Organization.

Dr. Steven Wilhelm will be traveling extensively this year from Chile to California then New Zealand to the Antarctic Polar Front. **Dr. Ena Urbach** will start teaching Bacterial Physiology next year and is continuing her collaborative efforts at Crater Lake in Oregon.

As far as the established faculty is concerned, **Dr. Barry Rouse** operates in the enviable position of working with three different NIH grants. **Dr. David Brian** recently received a sizable NIH grant as well. **Dr. Gary Saylor** continues his work in his Center of Environmental Biotechnology. His research professors from the center are also actively teaching. **Dr. David White** remains research active after his many years in the field. He is concentrating on a collaborative effort with UT Medical Center and their Pathology department.

The current focus is to maintain the established strengths of biomedical research and environmental biotechnology. The department plans to reconfigure in the coming months to bridge the gaps between these two distinct areas. Dr. Moore said, “It is our hope that our new faculty will play an extensive part in this process.”



DIRECTOR, *Continued from page 3*

about the average graduate stipend offered at peer institutions and about the National Institute of Health proposal to increase pre-doctoral fellowships to \$24,000 per year. Over the past several years our departments have collapsed the number of graduate stipends in order to increase the amount being offered to our graduate students. We are still below the average of our peers and dramatically below the NIH standard indicated above. The decrease in the total number of teaching assistants affects our ability to staff all of the sections of the courses being offered. We work hard to compensate for this decline in graduate teaching assistants but it still makes a modest contribution to the decline in enrollment.

We just completed budget preparation for the coming fiscal year. More numbers! I’m going to relate two particular sets of these to the topics mentioned above. We pay competitive salaries to new faculty, we must or they would not accept our job offer. However, many of our more senior, capable faculty who are doing an excellent job are paid significantly less than their colleagues of a comparable rank at our peer institutions. To raise the salary of our faculty to the level offered at our peer institutions would require an additional \$650,000 per year.

I mentioned graduate teaching assistant stipends. Our immediate goal would be to offer stipends of \$20,000 per year. This would make us truly competitive, but to do this would an additional \$390,000. We calculated that we could put another 40 graduate teaching assistants to work to help cover not only those courses currently being offered but also those we would like to offer on a more frequent basis plus new courses. This would cost an additional \$800,000 per year.

The research productivity across the Division, measured by research dollars awarded to faculty with appointments in the departments within the Division, is as high as ever. Last year Division faculty brought in more than \$11 million in external grant and contract support.

This is a real tribute to the high quality, energy and enthusiasm of our faculty. Although these are “research” dollars, they are also “teaching” dollars, in that most faculty members with active funding support both undergraduate and graduate student training projects in their laboratories. Last semester more than 80 undergraduates and well over 100 graduate students were working on projects in Biology Division laboratories.

The “numbers” point to our very strong contributions in training undergraduates and graduate students and in garnering the federal and industrial research dollars in support of those activities. We continue to offer high quality courses to both our undergraduate and graduate students. We regard ourselves as an important, central component of the excellence that underlies this university. We are relentless in our efforts to continue striving for excellence in spite of the budgetary problems imposed by the financial difficulties in the state of Tennessee.

We face considerable uncertainty as we look to the future. Our success at research and in attracting graduate students and undergraduates to our programs is creating a need for more space: both research and teaching. The changing demands of health and safety compliance are creating a need for new types of space to accommodate the personnel working in our research and teaching laboratories. Assuming we successfully hire the eight new faculty members being recruited this year, we will have essentially the same number of positions to fill next year.

In previous issues of *In Vivo* I’ve spoken of the prospect of even less state support for higher education and of our Provost’s effort at strategic planning for the university. We must look beyond our excellent numbers and peer inward, asking how we can utilize our existing resources more effectively without compromising our current performance, indeed, to improve on our current performance.



Blending art and finance



Denny Mullins would appear to have a dual personality, or at the least, be an individual who can effectively use both sides of his brain. Not only does he serve as the Division

Business Manager, he is also an accomplished musician.

Following a four-year stint in the U.S. Navy in 1971, he was admitted to the Peabody Conservatory of Music in Baltimore on an organ scholarship and finished up his bachelor's degree in organ performance at UT. Realizing that concertizing was not what he wanted to do with his life, he returned to the Johns Hopkins University in Baltimore where he worked for two college deans as College Business Manager. During this time, he married his wife, Lynne, and had two children, Piper and Spencer. He also received his master's degree in business administration while at Johns Hopkins.

In 1987 Denny returned to Knoxville (his hometown) to become the Division Business Manager for Biology at UT. Not wanting to abandon his love of music, he also accepted the post of Organist at the First United Methodist Church. He recently oversaw the design and installation of a new Casavant Freres pipe organ built in Quebec. Lynne teaches for The Greenway School (grades 6-8) where she coordinates the curricula. Piper attends UT as a Trustee Scholar and Spencer attends West High School.

The BBO

Denny came to the Division (then the Biology Consortium) in 1987 when the Biology Business Office (BBO) was tracking millions of dollars using outdated hand ledgers. Making a crucial decision to computerize business records and functions in the Division, the BBO soon became the lead guinea pig for UT's first computerized financial system. Since then, the BBO has seen another massive financial system come on-line, called IRIS.


During the previous fiscal year, the

BBO managed \$17 million in Division expenditures for a portfolio of over 250 active grants, contracts, departmental and facility accounts with a payroll of 750 people.

The BBO performs business service accounting and procurement-distribution functions. **Nanette Rodgers, Emily Dyke, Rosemary Webb, and Melissa Chesney** provide budget and fund accounting services while **Jerry Duncan and Matt Clemmons** process procurement orders. **Charles McDermott**, on-board since 1985, maintains the Division's central receiving and loading dock area and distributes all deliveries and packages to labs and offices upon receipt. The staff as a whole generates over 1,000 vendor invoices monthly to be approved by Denny and oversees approximately 65,000 individual procurement transactions each year.

In Denny's opinion, the BBO successfully uses "the team approach to handle the high volume and fast pace of a burgeoning workload." Two students currently help the staff, and Denny hopes someday that an addition to the full-time staff might be feasible.

While the BBO efficiently handles a heavy workload with the present staffing, the academic departments are also hard at work to hire new faculty members in the coming months. New faculty translate into new grants and contracts, increased payroll, and startup expenditures.

Denny's goal is to ensure that Biology's fiscal and business operations run smoothly and soundly through the energies put forth by the outstanding staff of the BBO — to the benefit of the Division's faculty, staff, and students. 

In Vivo

An alumni newsletter published by the Division of Biology

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AFM for the EM Facility by John Dunlap, Assoc. Coord.

We at the Electron Microscopy Facility (EM) have added a new scanning electron microscope (SEM) to our resources. It is a high resolution SEM that can work at low accelerating



John Dunlap

voltage. Historically biological samples had to be coated with gold before they could be examined in an SEM. The coating

could alter

and sometimes obscure delicate surface features and thus limit how much surface detail one could see. Using low accelerating voltage allows the investigator to examine biological material without the need for coating. This is a definite advantage to biologist.

Also, this microscope represents the first joint instrument acquisition between the Division of Biology and the Department of Materials Sciences and Engineering. Through a joint effort and pooled resources we worked together to purchase an instrument that represents a collective resource.

Also noteworthy is the fact that the Center for Environmental Biotechnology (CEB) group, specifically **Dr. David Niven's** in **Dr. Gary Sayler's** lab has received funding to purchase an Atomic Force Microscope (AFM). The instruments will be located in the Facility and like all the other instruments, will be open to the entire University community. These instruments will further expand the services available through the Facility.

If anyone would like to see these instruments I would encourage them to visit **Dr. David Joy** and I in the Science and Engineering Building, Room 101.



Alumni News

Neale Christman completed his degree in Microbiology in 1949. He is now retired and living in Mobile, Ala.

Justin Kim graduated from Biochemistry in 1991. He worked in the AIDS clinic at UAB for over three years, where he identified and cloned a new strain of HIV2 virus. He went to the CDC in Atlanta and worked as part of a team focusing on Polio eradication.

Last year he accepted a job with Amersham/Pharmacia in Piscataway, NJ as a field application specialist. His specialties are DNA sequencing, genotyping and SNP analysis. A significant part of his time is spent educating potential customers about new Amersham instruments or reagents. In addition, he works with existing customers when they are experiencing difficulties with use of these materials. He is really excited about working in his current environment and is constantly reminded of the contrast between working for a government entity like CDC and working in the business world.

Dr. Mark Lubkowitz graduated from the GST program in 1997 and is a currently a first year professor at Saint Michael's College in Burlington, Vermont. He teaches Botany, Cell and Molecular Biology, and is developing a Genomics and Bioinformatics course to be offered in the spring of 2003.

Dr. Lubkowitz's laboratory is currently investigating how changes in expression patterns of homeobox genes have led to morphological differences in leaves of monocotyledonous plants. This year he was awarded a Summer Fellowship from the Council of Undergraduate Research and a grant from the Vermont Genetics Network. For recreation, Mark and his wife Ginger have recently started a small vineyard named Chateau Briefly Complex.



Biocomputing

by Ron Johnson, Manager

The Division of Biology computing infrastructure has grown greatly over the last two years, with the deployment of seven Windows 2000 servers, providing over 200GB of network storage, and domain-based network architecture. This architecture provides for personal user accounts that can be used on any computer within the system. Additionally the deployment of two undergraduate teaching labs has greatly enhanced our ability to deliver on-line content to our students.

The recent purchase of a SUN Enterprise 250 server (for use as a college-wide web server) and an SGI Origin 300 (for use as an application server) will provide core services for our UNIX clients. The SGI server will host several molecular modeling applications in addition to providing the computational power required for our researchers.

The BioComputing support facility provides desktop support services to all faculty and staff within the division. The group is comprised of three staff positions with systems administration, network, and UNIX support being provided by myself. First level support and systems administration backup is provided by **Denise Beach** and second level (hardware/systems/network) support is provided by **Aaron Reynolds**.



Sequencer for MBRF

by Dr. Neil Quigley, Director

Joe May (Technician) and I of the Molecular Biology Resource Facility (MBRF) are enjoying the new 16-capillary electrophoresis DNA sequencer. This instrument (Applied Biosystems 3100) is now nine months old and is already proving it can easily handle the MBRF's user's demands. In fact, the average turnaround time for sequencing is now usually only two business days, and sometimes less.

Several user labs at UT are seeing even shorter turnaround times and are saving money by performing sequencing reactions in their own labs so they can

take advantage of the MBRF's 'Load Only' service (\$5 per sample). Same-day service or overnight service is almost routine with this option.

The older (almost two years old) single-capillary AB310 instrument is increasingly busy lately with fluorescent fragment length analysis work, including a current missing persons/Human ID project that is being conducted jointly with the Tennessee Bureau of Investigation.

With all the current faculty searches going on lately, I have been through my "dog and pony show" of the MBRF's equipment and services for many potential candidates. All of these visitors seemed very interested in the capillary electrophoresis and microarray facilities that are available at UT through the MBRF. Apparently, these facilities are not as readily accessible or affordable at several other universities. Happily MBRF plays a role in helping UT maintain its attractiveness to potential faculty candidates.



ANIMALS, Continued from page 2

help with. They appear "happier" living together than in separate cages. It also helps us because we no longer have to change their cages every day.

I recently purchased chocolate-flavored Nylabones for the rats. They really enjoyed this as the bones showed evidence of vigorous chewing. As soon as the bones were put in the cages the rats immediately pounced on the bones and started chewing on them. They would drag them around their cages.

The mice get tunnels, nesting material, and group housing; rats get group housing and nylabones; rabbits get balls with jingles to throw around; frogs have tunnels to hide in; and pigeons have bells and preening toys. The guinea pigs have a big pen to play in with shredded corn husk to chew on, tunnels, boxes, bags, and balls to hide in, and now the opportunity to socialize with each other.





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APRIL - MAY 2002



**Davis, Dr. Ray Holton and Dr. Wesley Wicks
at her retirement party**

In June of 1969 **Virginia Davis** began her work at UT. She subsequently spent all of her time in service to Biology. To say that she knew the inner workings of Biology by heart would be an understatement.

She has done it all: answering the same questions asked by new freshman every year, helping with course scheduling, managing the database on undergraduate majors, and many other duties. On January 31, 2002 she left campus for the last time to retire in nearby Maryville. Good luck wishes go to Virginia from the entire faculty and staff of the Division of Biology.

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