Futuristic visions motivate VIIBRE research
Vanderbilt’s push to attract a more ethnically, politically and geographically diverse student population has made great strides recently, according to the latest admissions statistics. At the same time, the University has recruited the most selective incoming class ever.

A record 11,628 students sought admission to the fall 2005 freshman class, while fewer than 4,000 of them actually received letters of acceptance. The 34 percent admission rate is well below last year’s 38 percent figure. “Applications for the Class of 2009 rose by 4 percent from last year as the University continues to attract an increasingly diverse and academically talented student body,” said William M. Shaia, dean of undergraduate admissions.

He noted that a record 977 students of color have been accepted for admission. This includes a 9.7 percent increase in Hispanic students and 5.8 percent increase in African-American students compared to 2004.

While the exact profile of Vanderbilt’s incoming freshman class will not be known until later this summer, Shaia is confident that these students will possess the strongest academic qualifications in the University’s history. He pointed out that admission to Vanderbilt is a “holistic review process,” and there is no specific test score or characteristic that results in acceptance or denial for a student. “They’re all high-achieving — the average test score is up more than 13 points. But we really do value the essays and experiences of our students as well,” he said.

So what is Vanderbilt doing to attract such talent and diversity? One factor is the addition of several new Arts and Science majors and minors, including African American and Diaspora Studies, and the renovation of the Black Cultural Center. The program in Jewish Studies and the opening of the Schuman Center have helped to attract both Jewish and non-Jewish students.

“The offering of these programs is important,” Shaia said, “because many students who ask about them don’t want to major in them but are still interested in some of the courses. I think the university’s commitment to these new courses is part of the reason that this year’s African-American class is the largest in University history.”

Perhaps the most surprising statistic regarding Vanderbilt’s increasing diversity is the political element. A recent survey of the 2004 freshman class indicates an “equal balance between liberal and conservative students, challenging the stereotype of a Southern conservative institution.”

“You can argue that Vanderbilt came to the issue of diversity later than some schools,” Shaia said. “But in classrooms, especially the humanities and social sciences, I am hearing that discussions are more intense and thought-provoking than they were 15 years ago. The tables at Rand are full of students of different backgrounds and interests sitting together, talking with one another. My guess is Vanderbilt shows a level of diversity and integration unprecedented in its history.”

For more information on Vanderbilt undergraduate admissions, go to www.vanderbilt.edu/Admissions.

A & S News

Incoming class most selective, diverse ever

Save the Date

Mark your calendars now to attend Reunion/Homecoming 2005 on Oct. 14-15 and catch up with old friends. The largest event held on campus, the celebration features Reunion parties for classes ending in 95 and 90, and Homecoming festivities for all alumni.
Professor extols global legacy of civil rights movement

Last winter Carol M. Swain, professor of political science and of law, traveled to Southeast Asia under the auspices of the U.S. State Department. During her trip to Myanmar (Burma), Malaysia, the Philippines and Vietnam, Swain discussed the global legacy of the U.S. civil rights movement with government officials and private citizens, including students and faculty at several universities. She became the first U.S. citizen ever to speak at Dalat University in the central highlands of Vietnam.

Her experiences abroad, she said, “gave me a new appreciation of who we are as a nation and where we've been.”


New director hopes to broaden definition of women’s studies

Any terms could be used to define Monica J. Casper, the new director of Women's and Gender Studies — feminist scholar, bioethicist, medical sociologist and mom. Indeed, Casper’s varied roles reflect one of her major goals since joining the University this fall — to expand the definition of women’s studies.

“Women’s studies is not just about women's identity — women's issues cross a wide variety of disciplines,” Casper says. “The program here has traditionally been based in the College of Arts and Science; however, I really want to connect with other schools within the University to examine what role women and issues related to them play in the worlds of business, law and medicine, for example.”

In addition to serving as director of Women’s and Gender Studies, Casper also has an appointment as an associate professor of sociology.

Casper’s expertise lies in the field of medical sociologists, specifically how women’s bodies and lives are impacted by science, technology and medicine. She is interested in issues such as how to balance pregnant women’s rights to informed consent and bodily integrity with the rising interest in fetal rights movement.


Her other research projects include

• A study of the impact of chemical weapons disposal on people in nine communities across the country.

New director hopes to broaden definition of women’s studies

The Sarratt Visual Arts Committee celebrated 20 years of the Margaret Stonewall Wooldridge Hamblet Award in Studio Art, awarded each year to a Vanderbilt student by the Department of Art and Art History. Among the recipients honored were Jenny Gill, BA'05, Alysha Irani, BA'03, Stacey Irwin, BA'98, Eleanor Luna, BA'94, John Powers, BA'01, and Joseph Whitt, BA'03.

This year’s Hamblet Award recipient is Kate McSpadden, BA'05. This oil painting, Dusk, was among the work that earned McSpadden the $20,000 travel and study grant.
The night sky inside the Stars in Their Eyes program began in the fall of 2004, more than 3,000 children as young as 5 all the way through adults. Since then, "Our goal is to interest minority students in science as a career. By projecting a representation of the night sky onto the dome's interior, we are able to teach students about the Sun-Earth-Moon system, the solar-system planets and their moons, the constellations and Greek mythology, the nature of stars and many other celestial phenomena in a fun yet informative manner," says David James, director of the Vanderbilt University Planetarium. James is research assistant professor of physics and astronomy at Vanderbilt and an adjunct professor at Fisk.

He and his colleagues have adapted the program for children as young as 5 all the way through adults. Since the program began in the fall of 2004, more than 3,000 children and adults have been through the planetarium, including some 100 teachers participating in in-service training activities. Approximately 50 percent of the participants have been minority students.

"You can use it to teach more and more advanced physics and astronomy, depending on the age of the students," James says. "You can also use it to teach the community about general science and the night sky, the importance of astronomy and the role of teaching their children. In this way, we have a multiplicative effect, helping us to reach as many communities, parents, teachers and students as we possibly can."

The Fisk-Vanderbilt NASA Road Show Program is part of the larger Fisk Astronomy and Space Science Training Program. That program mentors undergraduates and graduate students with the goal of increasing the number of minority students pursuing doctoral degrees in the physical sciences. It is largely funded by a grant to Fisk from NASA designed to build relationships between historically minority-serving institutions, like Fisk, and strong research universities, like Vanderbilt.

"We are trying to solve the problem of under-representation of minorities in the physical sciences, and in astronomy and space science specifically," says Keivan Stassun, a co-director of the program and assistant professor of astronomy at Vanderbilt with an adjunct appointment at Fisk.

"If you ask in 10 years’ time, who will be the minority students getting Ph.D.’s in astrophysics at Vanderbilt, those people are now matriculating freshmen somewhere, so it’s important to make investments in the pre-college arena. That’s where the road show fits in," he continues.

The Fisk-Vanderbilt partnership includes a new minor in astrophysics at Fisk, merit scholarships for undergraduates, mentoring and training, and a joint master’s-Ph.D. program between the two universities.

"This collaboration for us strengthens Fisk’s commitment to research in the space sciences," says Arnold Burger, associate professor of physics at Fisk and a co-director of the program. "The NASA grant allows the Fisk faculty to enhance our undergraduate curriculum, provide scholarships for deserving Fisk students and help them to transition smoothly into doctoral programs in astronomy and astrophysics. It also allows us to better serve the community and increase our student recruiting efforts."

—Melanie Catanias and David James

Student View

A fter traveling to Guatemala to learn Spanish, Avery Dickins realized her newfound fascination with Latin America had quickly evolved into a passion for studying indigenous cultures. Dickins, who received her bachelor’s degree from the College of Arts and Science in 1990, returned in 2001 to begin a Ph.D. program in cultural anthropology, focusing on Guatemala.

"During my first field season in 2001, I traveled with Professor Arthur Demarest to several Q’eqchi Maya villages near the Cancuen Archaeological Project. What I found was a rapidly changing region," says Dickins, now a graduate student in the Department of Anthropology. "There is a lot of development going on in this impoverished and marginalized area, so I decided to look at the effect of such development on the culture of the people.

Dickins is spending a full year conducting ethnographic research in Guatemala for her dissertation. A $12,000 grant from the National Science Foundation is funding her research.

Focusing on the Q’eqchi Maya group in the region, Dickins is working in a community called Muchivila. The village was founded in 1968 by families moving away from areas plagued by land scarcity. Today around 300 people live there. Muchivila’s translates roughly to “hidden water,” which refers to a system of caves and subterranean rivers found in the region.

“Recently, cave tourism has grown in popularity, and people go caving and rafting inside the caves,” says Dickins. “With the help of development institutions such as USAID and Counterpart International, the residents of Muchivila have just built a visitors’ center and trained several guides to take tourists into the caves. There are also groups introducing cash crops such as cacao, which provides villagers a way to make money, and other programs that teach women to cultivate a variety of vegetables in their home gardens to improve nutrition by introducing healthier food staples.”

In addition to these projects, Muchivila is one of the villages that will benefit from health care programs associated with the Cancuen development led by Demarest, Ingram Professor of Anthropology and director of the Fisk-Vanderbilt Cancers Archaeological and Community Development Project. The effects of such development are the focus of Dickins’ research.

Dickins hopes to determine what assets the Q’eqchi people had before the development projects, and who is in the best position to take advantage of the outside help from Vanderbilt and other institutions.

—James Doyle
VIIBRE opens door to new technologies

I magine a portable device similar to today’s home pregnancy tests that can quickly detect the presence of infectious diseases, including HIV-AIDS and measles. A hand-held instrument carried by soldiers and first-responders that can monitor the environment for biological agents such as ricin and anthrax. A hand-held instrument carried by soldiers and first-responders that can monitor the environment for biological agents such as ricin and anthrax.

Or a laboratory instrument that explores the mechanisms of action of an unknown toxin and suggests possible antidotes and therapies.

These futuristic visions are motoring forward research at the Vanderbilt Institute for Integrative Biosystems Research and Education (VIIBRE).

One of the University’s new transinitiatives, VIIBRE was created three years ago to help Vanderbilt become a leader at the intersection of the natural sciences, engineering and medicine. Directed by Professor John Wikswo, VIIBRE leverages Vanderbilt’s strengths in the biological and physical sciences, medicine, engineering and education. Wikswo’s other titles suggest his success in bridging many disciplines: Gordon A. Cain University Professor, A.B. Learned Professor of Living State Physics, and professor of biomedical engineering, molecular physiology and biophysics, and physics.

The greatest strength of VIIBRE is its breadth. The institute enjoys the expertise of multiple scientific and engineering faculty members from the College of Arts and Science, School of Engineering, School of Medicine and Peabody College, as well as several other universities and a number of companies. VIIBRE’s pool of scientists and engineers has pioneered numerous surgical, diagnostic and other medical technologies.

Controlling the single cell

One of VIIBRE’s main goals is to get to the heart of medical research in the 21st century: instrumentation and control of the single human cell. Now that the human genome has been mapped, the next challenge is to determine the structure and function of hundreds of thousands of proteins and protein variants encoded by the genome.

“Unveiling the genetic code was just the beginning,” says Wikswo. “The genome may describe 50,000 proteins, each of which could have as many as 10 variations. This complexity is overwhelming, especially when one considers the complicated interactions among multiple proteins, and between neighboring cells. Our challenge is to study the behavior, function and dynamics of a single living cell, the smallest unit of a living organism, in terms of the proteins and other components within it.”

Unlocking the secrets of the human cell is no Rubik’s Cube, done for the thrill of solving an extremely difficult, esoteric puzzle. Deeply understanding the cell holds the key to creating new drugs and drug-delivery systems in a more rapid, reliable, precise and effective way; developing new technology to diagnose disease with minimal invasiveness and understand the underlying pathologies; and exploiting what we’re learning about genetics in order to cure and treat numerous diseases.

“To understand biological function from the bottom-up requires considerable mental muscle and expertise in addition to computational power,” Wikswo says. “If we’re going to make fundamental and important discoveries, we need to harness the power of chemistry, physics, mathematics, materials science, computer science and engineering, particularly bioengineering and biomedical imaging.”

Key Technologies

VIIBRE has spent the last three years developing the ability to measure the metabolism of small groups of cells and studying how they respond to drugs, toxins and pollutants. One of the key VIIBRE capabilities — developed by a research team headed by Assistant Professor of Chemistry David Cliffel — is a set of sensors capable of simultaneously measuring the concentrations of the key chemicals that cells consume and excrete with enough sensitivity to monitor the health of thousands of cells confined in a small volume.

Cliffel’s research group modified an existing, bulky laboratory instrument by adding sensors for glucose, lactate and oxygen and created a “miniaturized microphysiometer.”

Under the leadership of Franz Baudenbacher, assistant professor of biomedical engineering and physics, Vanderbilt researchers have developed miniature sensor technologies to record rapid changes in the metabolism and signaling of individual cells. To handle small numbers of cells, the research group has adapted a method for molding micro-channels and valves into a material similar to that used in soft contact lenses. This has given them the capability to capture, manipulate, grow and study single living cells in extraordinarily small containers that are barely larger than the cells themselves. In the process, the group has applied for more than a dozen patents.

Canary in the Coal Mine

Most sensors that can identify toxic agents are single-purpose. That is, they can pinpoint the presence of a single toxin or a limited number of closely related toxins. The ability to monitor in detail the health of small groups of cells, however, makes it possible to detect the presence of unknown poisons as long as they affect cell metabolism. The power of this approach comes from the centrality of metabolism to cell function. Furthermore, examining the impact that an unknown agent has on different cell types can rapidly provide critical insights into its mode of action.

The Centers for Disease Control and Prevention maintain a “list of” of more than 70 biological agents that have been identified as those which terrorists are most likely to use in their attacks. The government has mounted a major research effort to develop detectors that can identify these agents and others that are either not yet known or were maliciously engineered, and to come up with treatments for them.

Developing a laboratory instrument for biomolecular diagnosis is the object of a new $5.5 million, five-year collaboration between VIIBRE scientists and the U.S. Army Edgewood Chemical Biological Center at the Aberdeen Proving Ground, Md., funded by the National Institutes of Health. The new system — called a “NanoPhysiometer” — takes the old “canary in the coal mine” trick and gives it a new, high-tech twist.

The basic idea is to create nanoscale cages small enough to hold a single cell up to a few thousand cells, add an array of biosensors that can monitor the cells’ health, and then expose them to minute quantities of suspected biological agents. Rather than studying slow responses like cell death, the trick is to look for rapid, metabolic changes. The way in which they react should provide clues to the nature of the unknown agent and help identify effective treatments and forms of prophylaxis.

“Cells are the ultimate canary,” says Roy Thompson, research biologist at the Edgewood Chemical Biological Center and a lead participant. “They respond to a wide range of chemicals and biologicals and signal from one cell to another about what’s going on in their environment. That’s their role. Using whole cells allows you to detect cellular signatures for a broad range of chemical and biological agents.”

Professor Cliffel has been working with Thompson for several years to develop the big brother and predecessor of the NanoPhysiometer. Their system can discriminate between a dozen different toxins. At the same time, Professor Baudenbacher has been pursuing the challenging task of shrinking Cliffel’s microphysiometer down to the size of a computer chip. The ultimate goal is a compact device that soldiers can carry into the battlefield and first responders can carry to the site of a terrorist attack that can monitor the environment for unknown biological or chemical agents. The first step at VIIBRE is to create a laboratory system that could do 100 such experiments simultaneously and provide information about a toxin even before it has been fully characterized. This capability is critical for identifying the drugs or antidotes that are best suited for treating those who have been exposed.

Home Testing for HIV/AIDS

HIV-AIDS is by far the most common form of AIDS, and forms of prophylaxis. HIV and Pria Diagnostics LLC, a privately held California company that specializes in miniaturized medical diagnostics, have joined forces to explore promising new technologies that may lead to a home-testing device for diseases such as HIV/AIDS. Such a device may be available in several years.

“Today the treatment for AIDS is very expensive, and there is always a question about when to start and stop anti-retroviral therapy,” says Jason Pyle, Pria’s chief technology officer. “We are developing a device that we hope will allow medical professionals and HIV patients to manage their disease in a way that is similar to how diabetes patients can monitor their condition with home blood glucose detectors.”

Pria has developed a low-cost way to measure microfluidics, optics, fluorescent dyes and electronics to create a male fertility detector that can be used in the home to measure sperm motility with great accuracy. VIIBRE capabilities may enable the company to apply their technology to a number of different areas. In addition to such “point of care” devices, Wikswo and Pyle are working toward the application “high-throughput” screening systems. Their goal is to use sensor arrays to garner information about dynamic cellular physiology and thereby discern how large numbers of compounds affect complex biological processes. This could have a major impact on the drug discovery process.

VIIBRE: The Next Generation

In addition to conducting world-class biosystems research, VIIBRE is training future scientists and engineers who want to pursue interdisciplinary research in post-genomic terms biology. To date, 18 postdoctoral research associates, 58 graduate students, and 43 undergraduates have participated in VIIBRE research projects, laboratory training programs and academic classes. The institute has produced new interdisciplinary classes and seminars, as well as summer research programs for undergraduates. It is also working to develop better teaching strategies and tools to prepare students for the highly complex and multidisciplinary world they will enter.

“The primary purpose of VIIBRE is to support and enhance research and education,” Wikswo says. “We want to teach our students the vast amount of information they need in the most expeditious and enduring ways available.”

— David F. Salisbury and Vivian Cooper-Capps

For more information, visit Exploration, VU’s online research magazine, at www.exploration.vanderbilt.edu
Yunus defies paradigms to empower the poor

Yunus was inspired by the micro-lending movement started by German economist Grameen Bank, which provides small loans to the poorest of the poor. Yunus realized that such loans could help people start their own businesses and lift themselves out of poverty.

Yunus started Grameen Bank in Bangladesh in 1976 with a loan of $27 to a poor woman. Since then, Grameen Bank has provided loans to millions of people in Bangladesh and other countries, helping them start small businesses and improve their lives.

Yunus’ work has been recognized with numerous awards, including the Nobel Peace Prize in 2006. He continues to work with Grameen Bank and other organizations to help reduce poverty around the world.
of Earth and humans alike. Meanwhile, population growth during this century will lead to demands for Earth resources—notably water, energy and habitable space—at unprecedented scales.

It is good that we are acknowledging and reacting to the pending global oil shortage, which will lead to significant social changes during this century. But more sobering, whereas humanity has existed for millennia without oil, it cannot exist without clean water or soil.

To what extent are these solutions to these problems? Although we cannot expect to remedy these environmental problems entirely, we must stop doing, or substantially change, much activity that degrades the natural functions of our environmental systems, and aim instead at achieving a sustainable balance between use and protection.

Some solutions must appear at many levels, locally to globally, individually to internationally, and in many facets—whether focused from social concerns and political pressures, economic and regulatory incentives, technological advances or just plain clever ideas. Indeed, recent thoughtful ideas suggest that theology and religion have important roles in the development of an Earth ethic.

And, we are rediscovering ancient approaches to resource conservation that serve well now.

Some solutions will, for better or worse, emerge inevitably. As water in the Ogallala aquifer is depleted, farming and irrigation practices in this region will change—as has occurred elsewhere. On the other hand, no-till farming practices, involving reduced water and pesticide use, are being recognized as not only environmentally friendly but also economically smart in certain areas. Economic and social incentives to pursue environmentally friendly farming practices are also emerging in other sectors, notably power production, transportation, architecture and urban design. And, it would be a mistake to ignore successful derivations from statutes like the clean air and water acts.

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Creating the perfect poppy-seed bagel

If you run into Ed Saff at a cocktail party and ask him what he does for a living, the mathematician is likely to reply that he is working on a “method for creating the perfect poppy-seed bagel.” Then he’ll pause and add, “Maybe that’s not the most accurate description, but it’s the most digestible.”

More accurately, Saff, professor of mathematics and executive dean of Arts and Science, has been working with his colleague Doug Hardin, associate professor of mathematics, to come up with a new and improved way to distribute points uniformly on various types of surfaces. Plotting a large set of equidistant points on a flat surface doesn’t take a mathematician: Any draftsman can do it. Thrown in a curve or two, however, and the problem gets much tougher. For complex surfaces like spheres and bags (which form a shape that mathematicians call a torus) it becomes so hard, in fact, that mathematicians have not found a way to do it with absolute precision.

Recently, Hardin and Saff analyzed a method for generating large numbers of points that are spread with near uniformity over practically any surface of any dimension. Their effort was described in the cover article in the journal Nature.

The researchers propose a surprising number of applications. Among other things, it comes in handy when trying to digitize curved surfaces for computer graphics and animations with greater efficiency; placing the elements of a sonar net on the ocean bottom in the best locations to detect the presence of submarines; and testing radar systems in aircraft to ensure uniform coverage.

Their theorems also help explain a variety of natural phenomena. They describe some well-known patterns such as that of spores on spherical pollen grains and the way electrons distribute themselves on the surface of a sphere. They also promise to provide new insights into the relationship between certain chemical forces and surface shapes will allow them to create new kinds of thin films and self-assembling membranes that could be useful in certain medical applications.

“I think that we are really at the very beginning of something very big and very exciting that we couldn’t see when we looked only at the sphere,” says Saff. “Now, if we could only figure out how to design the perfect cheese dam!”

—David Salisbury

Circadian rhythms — it has long been known that constant exposure to light disrupts our internal clocks, resulting in problems like jet lag and sleep disorders in extended-shift workers. A study led by Douglas McAlpine, professor of biological sciences and a Kennedy Center investigator, reveals that although the choice of individuals exposed to constant light may get out of synch, they keep ticking. The findings offer insight into how to modify constant-light situations to lessen their impact on humans.

The research was published online in February in the journal Nature.

Dark Matter — In the last few decades, scientists have discovered that the cosmos appears to be filled with two invisible constituents — dark matter and dark energy — whose existence has been proposed based solely on their gravitational effects on ordinary matter and energy.

Now, Professors Greg Gordon, Robert J. Scherrer, and Doug Hardin have produced a bibliography of Noam Chomsky, which has been translated into several languages, including Greek, German, French and Portuguese.

Rolphs Blake, Centennial Professor of philosophy and chair of the department, has been elected a Fellow of the American Philosophical Society in this elite group.

David Cliffer, assistant professor of chemistry, recently received the 2005 Young Investigator Award from the Society for Electroanalytical Chemistry.

Alain Connes, Distinguished Professor of Mathematics, recently received one of France’s most noteworthy scientific awards: the Agropolis International and the Centre National de la Recherche Scientifique.

Arthur Demarest, Ingram Professor of Anthropology, is the first U.S. citizen to receive one of Guatemala’s highest awards, the National Order of Cultural Patrimony. In addition, Choice magazine has selected The Terminal Classic in Maya Lowlands, edited by Demarest, Prudence M. Rice and Don S. Rice, as a 2004 Outstanding Academic Title.

Earl E. Fitz, professor of Portuguese, Spanish and comparative literature, is the author of a new book, Brasilian Traditions in a Comparative Context, published by the Modern Language Association. It was commissioned by the MLA to be the premiere volume in a new series, World Literature Reimagined.

Gary Jensen, professor of sociology and religious studies, received the Joe B. Wyatt Distinguished University Professor Award at the Spring Faculty Assembly.

Teresa Goddu, Jane Landers and Mark Wollinger have received fellowships from the National Endowment for the Humanities. The grants, worth up to $40,000, are awarded to individuals pursuing advanced research that contributes to scholarly knowledge or to the general public’s understanding of the humanities.

Carlos Jáuregui, assistant professor of Spanish and anthropologist, recently won the Premio Casa de las Américas, one of Latin America’s oldest and most prestigious literary awards, for his soon-to-be-published book, Carcel. The book examines caísmismo as a recurrent cultural metaphor.

Kudos

Michael Aurbach, professor of art, recently was elected to the board of the Mid-America College Art Association.

Jo-Anne Bachorowski, associate professor of psychology, received the Madison Sarratt Prize for Excellence in Undergraduate Teaching at the Spring Faculty Assembly.

Robert Bursky, professor of French, linguistics and comparative literature, has published a biography of Noam Chomsky, which has been translated into several languages, including Greek, German, French and Portuguese.

Randolph Blake, Centennial Professor of philosophy and chair of the department, has been elected a Fellow of the Society of Experimental Psychologists, considered one of the most prestigious honors an experimental psychologist can receive. He is a fellow of Vanderbilt psychologists, Distinguished Professor Jacob Aronson and Centennial Professor Gordon Logan.

Professor Doug Hardin left, and Ed Saff have produced formulas for distributing points on curved surfaces.
Remember wearing ties to class? Bobby socks and saddle oxfords? Raincoats over Bermuda shorts? Here is a look back at changing student fashions, courtesy of the Vanderbilt Photographic Archives: a) up close and personal in the '80s; b) '50s pep rally; c) the long Mod line in the '70s; d) costumes in the 1940s; e) 'nuf said; f) the 1960s Miss Commodore "flip"; g) hippies, Vanderbilt style; h) Owl Club initiation circa 1930s.