**History of Comics Discussed By ‘Michelangelo and Medic’ of Art**

By ZHIYUN GUAN

Comics may look simple and ephemeral to many, but they are anything but. The history and changing identity of comics as an art form was the subject of Art Spiegelman’s lecture, “Comix 101,” on Wednesday in Beckman Auditorium. Called the “Michelangelo and Medic” of the comic world, Mr. Spiegelman helped bring the medium into the world of serious art and literature.

A Politier Prize recipient, he is widely known for his graphic novel Maus, an account of his family’s survival during the Holocaust, and the Shadow of No Towers, a reflection on the 9/11 terrorist attacks. Wednesday’s lecture was part of the Words Matter project, which brings renowned writers to campus to lecture and interact with students.

Engaging the audience with his conversational tone and wit, Spiegelman began by imploring, “think of this as a performance. I go to play an obsessive-competitive cartoonist tumbling on and on about the medium that he fell in love with at an early age.” Everything he knows, Spiegelman said, he learned from comics including how to read. “I want to make a case for comics as some sort of art,” he concluded. The mind, Spiegelman explained, works like a comic, using “small bursts of language” as well as simple images.

Comics that are true art have a personal reach, and tell a story by creating “time turned into space.”

Admissions Director Richard Bischhof has plans to improve pre-freshmen’s experience and help attract more students.

**Freshman Application Numbers Fall Slightly**

By DAVID CHEN

Although most current Caltech students are more concerned with their next problem sets, there once was a time when they were primarily worried about one issue, whether that big envelope would come. Deciding who will be the future undergraduates of Caltech remains an important issue, and though there are few changes in the admissions world, Caltech is primarily following its prior trends.

Caltech admitted 154 students out of 444 applicants for the early action pool. This is roughly the same number of applications as last year, although slightly lower. In addition, the number admitted early is slightly lower than last year, although the committee did not purposefully seek to admit less applicants from the early pool. For comparison, MIT also had slightly fewer applicants for early action this year, with 2,822 applications compared to last year’s 2,833 applicants.

The admissions committee is composed of undergraduates, faculty members, and admissions officers. There are about 16 faculty members on the committee. The current undergraduates serving (the list on the website does not include all undergraduates on the admissions committee) are Tim Boyd, Meng-meng Fu, Ben Golub, Warner Leedy, Peter Foley,

**Film Shows Subtlety Of Bullying by Girls**

By CHRISTINE CHANG

Most often, the term “bully” evokes images of a large boy threatening to take away a smaller boy’s lunch money. However, until recently, many have ignored the more subtle bullying between girls. While males bluntly show their aggression, females use the complex societal web and rumors to stab at their perceived enemies. Held by the Women’s Center, a documentary titled “Mean Girls: the ‘queen bee,' the most popular girl in school dismissed the rumors and welcomed the girl back into the group.

The hardest thing is the competition between girls,” said Michelle, a senior attending an all-girls high school at the time the video was shot. Often, the competition between girls could lead to the invention of rumors against one or both of the girls. In the video, rumors were spread about one of them being a “lesse.” The boys, rather than face the alleged gossiper, who also was one of her friends, chose to defend herself with others in the group and convince them to join her side. Soon, the group was effectively split between the two camps. However, the situation was decided somewhat when the “green bee,” the most popular girl in school dismissed the rumors and welcomed the girl back into the group.

The hardest thing is the competition between girls,” said Michelle, a senior attending an all-girls high school at the time the video was shot. Often, the competition between girls could lead to the invention of rumors against one or both of the girls.

**Olympic Bronze Medalist Helps Recognize Our Women Athletes**

By ALEX SIEGEL

Caltech is in share of lectures by scientists and engineers, but when an Olympic medalist and member of International Olympic Committee agrees to give a lecture it’s sure to turn some heads. The Women’s Center and Caltech Athletics sponsored Anita DeFranz to give a talk last Wednesdays in Braun Gym in honor of National Women in Sports day. Anita DeFrantz was a Bronze medal in rowing during the 1976 Olympic Games. Afterwards, she went to Law School and earned her degree. She became president of the Amateur Athletic Foundation based in Los Angeles. She is also a member of the International Olympic Committee and became the first ever woman and African American to become a vice president on the IOC’s executive board. Despite her busy schedule, she still finds time to go on recreational rowing trips in Mariner del Ray.

DeFrantz feels that playing sports is “one of the most important things we do in humans.” She discussed some of the challenges faced in college sports today. She described Title 9, the law that requires equal government funding for both male and female college sports programs. Despite many people’s dislike for Title 9, DeFranz “put[s] the fault elsewhere, on decision makers” not on Title 9 itself.

DeFrantz went on to discuss the challenges of being a woman in sports as a female athlete. In the late 60s and into the 70s, team sports for women finally entered the Olympics. The Olympics have become increasingly equal in its ratio of men to women athletes. In fact, the Olympics in Athens this year set a new record for highest per
percentage of women participating in the games, reaching 40.6%. DeFrantz feels that this shows a big improvement over previous years, though she hopes to someday achieve an even more equal ratio. DeFrantz closed with her belief that the “last challenge is of sports,” an area of athletics that still consists of many more men than women.

The talk was followed by a question and answer session. DeFrantz was asked about her role in the Amateur Athletic Foundation of Los Angeles. Founded with the excess money from the 1984 Olympic Games in Los Angeles, it spent much of the money on Grants for youth sports programs in Los Angeles. Their mission is to “increase public understanding and appreciation of sports.” In order to further this goal, they have collected over 200,000 pages of information in one of the largest online sports libraries that exist today.

DeFrantz closed with her retelling of the 1976 Women’s rowing race, in which she and her team won a bronze medal. Her team was placed in the seventh slot, way off to one side in the deeper ocean, where the current was naturally stronger. They knew it was unfair, but they were very determined to take home the gold. Though they later found out that no one expected them to win, they pushed themselves to their limits and won a medal anyway. Racing at 36 strokes per minute, they managed to finish third despite the challenges of their lane. They felt proud at their accomplishment, mad at not having won gold, and very sick from the build up of lactic acid, all at the same time. After that day, DeFrantz remarks, “I realized how hard I could work without dying.”

Peers See Increase In Application Counts; Early Acceptance Notices

Katie Richardson, Vicki Loewer, Wendy Xu, Lisa Fukui, Shelby Montague, Rosaline Reinecke, Mayra Sheikh, Sarah Wilhoit, Julia Ma, and Kayte Fischer of Caltech continue to use an early action program, allowing applicants to apply to multiple schools during the early application period. Many peer schools now use single-choice early action, limiting the applicants to only that school during the early period. Stanford and Yale moved to a single-choice early action program two years ago in an early decision program, which is even more restrictive and binds the prospective student to attend the school if admitted early. In addition, Harvard moved to SCEA from early action two years ago. Prospective teachers, however, are still able to apply to both MIT and Caltech early action.

Most of Caltech’s peers saw their applicant pools increase this year, Harvard, for example saw an increase of 7.2% in its early action pool. This change was possibly caused by Harvard’s President, Lawrence Summers, declaring that families earning less than $40,000 no longer have to pay a parental contribution (the student would have to pay a small amount from savings or work). Stanford had almost a 6% increase in its EA pool, although Yale saw a decrease of 5% this year after its meteoric rise two years ago.

Of the early applicants, a couple hundred were deferred for consideration during regular decision. Caltech’s regular decision pool currently consists of 2750 applicants, compared to 2761 applications for last year, although Admissions Director Richard Bischoff noted, “There are always applications that come in late, from around the world... when suddenly an application may come from Bulgaria, or China, that took a long while to make it here.”

Mr. Bischoff praised the faculty and students on the admissions committee for an amazing job. Because they were able to do such a terrific job, reading files and turning them around, we actually got our admissions decisions out December 10th, rather than December 21st when we mailed them out last year.” He also praised the work of David Levy and the financial aid office, who were able to mail preliminary financial aid announcements on December 20th-21st.

Of course, after admitting potential students, the admissions office is trying to recruit these students to come here. Our overall yield last year was 37%, which produced a class of 207 students. The admissions committee plans for an incoming class of 215 students, the number that Caltech traditionally aims for. The dates for Prefrosh Weekend have already been decided, and the prefrosh will have all needed info by the end of this month, to help them arrange their travel plans. House representatives have already been appointed, and four students have been invited to be on the planning committee for Prefrosh Weekend.

“At the admissions office, we’ve been looking at Prefrosh Weekend, trying to figure out how we can make it a better experience, and not just a better experience for the prefrosh but also for our current students,” explained Mr. Bischoff.

Mr. Bischoff described his impression of Prefrosh Weekend last year, when he was visiting Pasadena with his wife. He explained, “We were feeding the prospective students, but student hosts were not invited. Particularly on this campus where students are not offered meals on the weekend, to have our prospective students come and eat lunch and say to the hosts, ‘Oh, you gotta go find yourself’... We’re not going to do that. We’re going to make sure that the students who are hosting are able to eat lunch with their prospective students. We want to treat the hosts well.”

Mr. Bischoff emphasized that the prefrosh should be well-treated, and they should feel respected. Responding to a question regarding the extreme nature that some students display during Prefrosh weekend, Mr. Bischoff said, “But if the experience is atypical of life at Caltech, then we’re not doing these prospective students any favors. And we’re certainly not doing Caltech any favors if this somehow deprives the community of any students that would be here otherwise that they’ve been scared away.”

The admissions committee will continue to be hard at work, reading over the regular decision applications and deciding the remaining students who will receive the coveted envelope.

The California Tech

The Tech is published weekly except during vacations and commencement periods by the Associated Students of the California Institute of Technology. The Tech reserves the right to edit and abridge all submissions for the purposes of space, style, and content. All advertising should be submitted electronically and on diskette. All submitted ads are subject to approval by the advertising desk. All advertising should be submitted at least two weeks in advance of publication. All advertising rates are subject to change. The advertising desk can be contacted at (626) 395-6154.

Research Scientist Matt Gerstenlager outlines a USGS study that aims to use past earthquake data and knowledge of aftershocks to help predict the effects of earthquakes.
Women’s Fencing Pulls Out Win Against Stanford, Women’s Tennis Beats Masters College; Men’s Baseball Opens Season

By MIKE RUPP

Caltech Athletics

Fencing: Women’s Epee upssets Stanford

The Caltech Fencing program had a fine performance this past weekend at a four-team NCAA meet at UC San Diego. Teams from Stanford University, the Air Force Academy, Northwestern University, CSU Fullerton and UC San Diego all competed. The highlight of the Invitationals for Caltech was the jolied-up 8-1-1 establishment of a women’s record team over Stanford University. Sophomores Katherine Harvard, Emma Schmidgall and Klinika Szwaykowska gave Caltech its sole win of the day, competing against some of the best NCAA teams in the country. The Men’s Epee team, with senior Eric Cadly, freshman Alexi Harvard and junior John McNelly, fell just short of mirroring the accomplishments of the women’s squad, losing to Stanford, 7-2.

La Freshman Lindsay King added 12 points, nine rebounds and two assists. Earlier in the week, the team lost to Cal Lutheran, 51-89. King led the team with 20 points and seven rebounds. The team plays its next game this Thursday night against Mudd-Scripps. Their next home game comes this Saturday against Pomona-Pitzer. Tip-off is at 3:00 PM.

Women’s Tennis pulls out one against Masters College

The Women’s Tennis team improved to 2-4 on the season after their 5-4 win over Masters College this past Saturday.

Men’s Basketball opens season against Simpson, UC Santa Cruz

The Caltech Baseball team opened its season with three straight losses this past week. On Thursday, the team hosted Simpson University. Senior Isaac Gremmer pitched six innings for the team, but a huge deficit in the 2nd inning led to a 2-0 loss after the 5th inning. Leu was engrossed in an epic battle against her opponent. Leu saved a third point, and finally emerged triumphant in a stunning 7-5, 4-6, 7-6-(7-4) victory. The team plays its next match this Saturday at home against Cal Lutheran. The match begins at 9:30 AM.

Men’s Baseball opens season against Simpson, UC Santa Cruz

The Caltech Baseball team opened its season with three straight losses this past week. On Thursday, the team hosted Simpson University. Senior Isaac Grennier hit a two-run homer and Senior Jason Quinney went three-for-five. Freshman Shawn Surdy pitched a complete game as Caltech lost, 8-13. On Saturday, the team played a double-header against visiting UC Santa Cruz. Grennier pitched six innings for Caltech and had two hits and an

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Women’s Basketball

Thursday, February 10 vs. Claremont-M-S 7:30 PM - CMS

Saturday, February 12 vs. Cal Lutheran 9:30 AM - Caltech Courts

Men’s Baseball

Saturday, February 12 vs. Pomona-Pitzer 5:00 PM - Bronn Gym

Saturday, February 12 vs. Pomona-Pitzer 7:30 PM - Bronn Gym

Lawrence A. Wollman, President

Women’s Fencing Pulls Out Win Against Stanford, Women’s Tennis Beats Masters College; Men’s Baseball Opens Season

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COMMENTARY

After the Elections...

By SIMON QUE

First, a note to readers. In last week's issue of The Tech, Tammy Mader's column, students were too few of them, and partly because I didn't have the time to write one. It'd be great if some of you wrote for The Tech's commentary section, whether on occasion or regularly. It would help Tammy fill up this paper and help the rest of us commentary writers carry the burden of having to write something for Tammy every week.

I don't care what you write about. If you can't think of something, here's a suggestion: I know that there are those of you out there who read my articles in this publication. So one thing you could do is write responses to my articles or your own political column. I welcome anyone who wants to do this.

The Iraqi people have voted. So far, the United States and the Coalition have maintained that Saddam Hussein's regime was not to be compared to those of other Middle Eastern dictatorships. Now, we have the results of an election that was supposed to be a democratic process, and we are left with a complex situation, with answers that can only be found through further research and analysis.

The Iraqi people have voted for a new government, and we should respect their decision. However, we should also be aware of the challenges that lie ahead, as the new government faces the task of rebuilding the country and restoring order.

The election results have shown that the Iraqi people want a democratic government, but they also want stability and security. The new government will have to work hard to address these issues and to ensure that the Iraqi people have a voice in the decision-making process.

In conclusion, the election results are a step forward for the Iraqi people. However, the challenges that lie ahead are significant, and we should be prepared to support the new government in its efforts to restore order and stability to the country.

Letters to the Editor

Errors in Water Lecture, Tuition Rate Hike Articles

Dear Editor,

Thank you for the article by David Chen on your Water lecture. Could I please ask you to correct a few things for me?

The arc-minute separation between the orbiter and Venus was estimated from the orbit of close approaches, and the values obtained from this analysis were subsequently estimated to be about 120 kiloNewtons, i.e., 12 thousand Newtons. This is a scaling number, and it was mentioned that a correspondingly smaller fraction would be applicable to the plane.

The estimate of the force that would have been exerted by the fact that the incidence had been perpendicular, was estimated to be about 120 kiloNewtons, i.e., 12 thousand Newtons. This is a scaling number, and it was mentioned that a correspondingly smaller fraction would be applicable to the plane.

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Clint Eastwood’s Million Dollar Baby Provides the Knockout, Then Leaves an Indelible Mark

By HARRISON STEIN

Note: For those concerned, this review is Spoiler-Free.

Last year, in reviewing Clint Eastwood’s brilliantly acted, yet mind-numbingly disappointing Mystic River, I stated that Clint Eastwood’s directorial skills had eroded like an aged baseball player after re-watching Eastwood’s 1991 Oscar winning masterpiece Unforgiven and viewing his latest classic, Million Dollar Baby. I can only arrive at one conclusion: I’m an idiot. As much as Clint Eastwood, the actor, changed the face of Hollywood during the 60s and 70s, his directorial efforts are, for the most part, more polished, more effective and more timeless than the films that made him famous. Mystic River is still a major hiccup on Eastwood’s resume, but with Million Dollar Baby, he has redeemed himself as a director and shown that he can still act a bit.

Baby begins an intense boxing scene, a taste of what is to come. We meet Frankie Dunn (Eastwood), a crusty, hardnosed manager that teaches far more than he promotes, yet hasn’t managed a title fighter in 10 years. After deftly coaching his latest contender to victory, Frankie runs into Maggie (Hilary Swank), a thirtysomething trailer-trash waitress with a passion for boxing. Maggie, yearning for one last shot to make something of her life, begs Frankie to become a championship trainer.

Frankie agrees to coach Maggie. When Maggie is rising from the rubble to become a championship fighter and Frankie has a spiritual awakening. If the film had simply continued on this path, it would have gone down into film lore as a well-acted, expertly-directed, but somewhat typical sports movie. Instead, the story takes a tangent, concentrating on Maggie’s family rather than Frankie’s. This makes the film far more important than it is. The film is about Maggie’s family, not Frankie’s. The efforts of Maggie’s family are as much a part of the story as the efforts of Frankie and his brother, Teddy (Chiwetel Ejiofor). The story is about the family and the difficulties they face in trying to overcome the challenges of Maggie’s career.

Maggie is a good-hearted, hardworking character. She is a woman who has been through the ranks with a title shot on her mind. Swank takes us along for the ride. Of the three actors, she shows the most raw emotion, and her scenes with her family are heartbreaking. Even though we only see her for two hours, we feel as if we have known Maggie for 30 years. Hilary Swank’s portrayal might fall slightly short of Catalina Sandino Moreno’s touching debut in Mara: Full of Grace and Natalie Portman’s breakout role in Closer, but she is marvellous, and she is expected to take home her second statuette.

One of my primary problems with the highly flawed Mystic River was that Eastwood didn’t seem to have any command of his material, and, subsequently, the movie was improperly paced. Maybe the cure to all of his directing woes is to cast himself in his movie. When he is actually on camera, Eastwood can witness the dynamics of a successful film unfold right before his eyes. Since he can directly contribute to his project, he knows exactly how all the individual parts will mesh in order to form his vision. The technique has now worked splendidly in both Unforgiven and Million Dollar Baby, and if this film follows its predecessor, it too will take home the top prize at next month’s Oscars.

In my opinion, Million Dollar Baby is the epitome of cinematic excellence. Because the acting, directing, camera work and writing are all remarkable, the story is compelling enough to grab our attention and remains shocking enough to hold it.

Controversy aside, Million Dollar Baby is a stunning motion picture that deserves to be talked about, but not ruining. Baby packs a punch and an emotional wallop unlike any other movie released this year. It is something to treasure.

The Beckman Political Internship

The Beckman Political Internship will be available again this summer. The internship, supported by friends of Arnold O. Beckman, will pay a stipend of $5,000. It allows a selected intern to spend the summer working in the office of a politician or a government agency and to see from the inside the process of government. The applicant is expected to make arrangements with the appropriate political persons or organizations. The internship is open to any Caltech undergrad who intends to be a student next year. If interested, submit a proposal describing where and how you wish to use the stipend along with one faculty recommendation, to the Deans’ Office, 210-87, or email mchamp@caltech.edu, by MONDAY, MARCH 28, 2005.

Caltech Idol Contest/Spring Fling Luau

The Tech Express is holding their second annual Caltech Idol Contest and Spring Fling/Luau! The extravaganza will be held on March 9th, 2005. The Caltech Idol contest will be held from noon-1:30 pm, and the Spring Fling with food and festivities will be from 11 am to 3 pm, outside of the Tech Express. The contest is open to all undergrads, but the entire campus is invited to come watch and help themselves to the free food and great prizes. Last year’s winner will be participating again this year, and the Hawaiian Club Hula girls will also perform.

Caltech Public Events: Coming Soon...

Ologlund:
Sat, Feb 12, 8pm $22, 18, 14

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YOU minimum As are available TO Los Funds Access visit (AF “APPA” has DEED of BE 3D Educa­ to (BDCP). This pro­ of & offers 10-12 undergraduate scholar­ applications are available in the Caltech a scholarship program to encour­ ers are now available. This schol­ arship is available to eligible students who are U.S. Citizens and who are completing their sophomore year or higher, with a minimum GPA of 3.0. Applica­ tions and supporting materials are available at: www.ncajwla.org/. The deadline to apply is April 15, 2005.

The College Women’s Club of Pasadena scholarship applications are now available. This scholarship is available to eligible students who are U.S. Citizens and who are completing their sophomore year or higher, with a minimum GPA of 3.0. Applications and supporting materials are available at: www.ncajwla.org/. The deadline to apply is April 15, 2005.

The Swedish Club of Los Angeles offers two $2,000 Scholarships: “The Olsen T. Seaborg” scholarship in Science, and the “Walter G. Danielsen” scholarship in International Rela­ tions and Diplomacy. Require­ ments include: transcripts, letters of recommendation from two professors, resume, statement of goals, and a demonstrated interest in Scandinavia. Juniors, seniors, and graduate students are eligible. Application information is available in the Financial Aid Office.

The 2005 Olive W. Garvey Fellowship awards are now available. This fellowship, available to both graduate and undergradu­ ate students, is awarded based on the best essay on the topic: “The great aim of the struggle for liberty has been equality before the law.” The deadline is May 1, 2005. For further information visit: http://www.independent. org/students/garvey.

American Public Power As­ sociation (“APPA”) has DEED Student Research Grants and Internships available. Each year up to four, $4,000 student research grants and internships are awarded to students conduct­ ing research on an energy-related project. Students in under­ graduate or graduate disciplines are eligible. Students must obtain a DEED member sponsor for their student research grant or internship. App­ lications are accepted January 15 and July 15 each year. For more information visit: http://www.appanet.org/irs.

Citizens for Global Solutions is holding a FLASH Movie Con­ test “Global Solutions for a New Year.” The top prize is $1,000. Please visit: http://cad.gov/c004674429318.

The Minerals, Metals & Materials Society (“TMS”) offers a variety of scholarships. To pre­ view scholarship eligibility and deadline information visit: www. tms.org/Students/AwardsPro­ grams/Scholarships.html.

The Society of Plastics Engi­ neers offers 10-12 undergraduate scholarships. Please visit their website for deadlines, schol­ arship guidelines and applications: www.kpoe.org.

The Excellence in 3D Ani­ mation Award is a $1,000 cash award awarded quarterly by Troy Studios to encourage students to pursue Graphics Arts and Animation. Award winners are chosen based on their entries in a contest. The context is open to all students of all nations, regardless of field of study. To enter the contest, students should down­ load free software from the www. animals.com website. Please visit their website for more detailed information. There are four quarterly deadlines each year (Feb 28, May 31, Aug 31, and Nov 30)

Educaid is offering their “DoubleTake” Sweepstakes. Win two $2,500 scholarships - One for you and one for your school. Applications are available in the Financial Aid Office, or on Educaid’s website: https:// www.educaid.com/doubletake.

If you are a college student who is interested in becoming a naval officer when you graduate, you could apply for the Bac­ calaureate Degree Completion Program (BDPC). This pro­ gram pays future naval officers a monthly salary while they are still attending college. Qualified technical majors can receive a salary of approximately $1,500 per month for up to 3 years prior to graduation and qualified non-technical majors can receive this salary for up to 2 years prior to graduation. Additional information is available at: www. navy.com.

The National Council of Jewish Women/Los Angeles provides a variety of scholarships year-round for women, regardless of religious belief or ethnic background, who reside in Los Angeles County. The organiza­ tion focuses on each applicant’s dedication to their chosen path and her financial need. Application information is available in the Financial Aid Office. For more information visit: www.ncjwla.org.

The Air Force Reserve Officer Training Corps (“AFROTC”) offers 2 year to 3.5 year scholarships in all majors. The scholarships are generally capped at $15,000 per academic year towards tuition and fees, with an annual book allowance of $490 and $200/month stipend during the school year. Full-time student status, AFROTC program involvement, and a minimum of 2.5 cumulative GPA is required to be eligible. For more information visit www.afrotc.com.

The following information is available at: www.global solutions.org

USA Funds Access to Educa­ tion Scholarships are now available to students with demonstrat­ ed financial need. USA Funds will award up to $3 million dol­ lars in renewable scholarships. Scholarships range from $750 to $1500 per academic year based on enrollment. Please visit their website for requirements and application forms: www.usafunds.org. The deadline to apply is March 15, 2005.

The American Society of Na­ val Engineers (ANEN) sponsors a scholarship program to encour­ age college students to enter the field of naval engineering. Currently one year scholarship awards are $2,500 for under­ graduate students, and $3,500 for graduate students. Applications and supporting materials are available at: www.anen.org. The deadline to apply is March 15, 2005.

Caltech Ballroom Dance Club offers a scholarship program to continu­ ing students who are interested in majoring in the field of dance. Applications are available beginning February 4th, 2005. The deadline to apply is March 15, 2005.

Cooperative Education Scholarship funds are available for students who are enrolled in a dual degree program or an intern­ ational internship. Applications are available at the Financial Aid Office. The dead­ line to submit all materials to the Caltech Financial Aid Office is: February 15, 2005.

The Swedish Club of Los Angeles offers two $2,000 Scholarships: “The Olsen T. Seaborg” scholarship in Science, and the “Walter G. Danielsen” scholarship in International Rela­ tions and Diplomacy. Require­ ments include: transcripts, letters of recommendation from two professors, resume, statement of goals, and a demonstrated interest in Scandinavia. Juniors, seniors, and graduate students are eligible. Application informa­ tion is available in the Financial Aid Office.
Scientists Build DNA Computer for Fractals

By ROBERT TINDOL

PASADENA, Calif.—In a demonstration that holds promise for future advances in nanotechnology, a California Institute of Technology computer scientist has succeeded in building a DNA computer that computes as it grows. As the computation proceeds, it creates a triangular fractal pattern in a nano-crystal.

This is the first time that a computer has been created in the growth of any crystal, and the first time that computation has been used to create a complex microscopic pattern. And, the researchers say, it is one step in the dream of nanoseismologists to master construction techniques at the molecular level.

Reporting in December the issue of the journal Public Library of Science in the United States, assistant professor Erik Winfree and his colleagues show that DNA "tiles" can be programmed to assemble themselves into a crystal bearing a fractal pattern known as a Sierpinski triangle.

"This is the first experimental demonstration of a fractal computer which Winfree has been developing over the past 15 years," says Winfree's group created DNA tiles that look like a Sierpinski Triangle. The fractal pattern is more complex than patterns found in natural crystals because it never repeats. Natural crystals, by contrast, all bear repeating patterns like the tiling of a bathroom floor. And, because each DNA tile is a knot of DNA with just 15 base pairs (an entire human genome has some 3 billion), the resulting DNA tiles stack in the wrong place, computing the wrong sum, and destroying the pattern. The largest Sierpinski triangle that grew contained about 200 DNA tiles. But it is first time such this has been done, the researchers believe they can reduce errors in the future.

In fact the work is the first experimental demonstration of a fractal computer which Winfree has been developing over the past 15 years, says a report in the journal Public Library of Science in the United States.

"This is the first time that a computer has been created in the growth of any crystal, and the first time that computation has been used to create a complex microscopic pattern. And, the researchers say, it is one step in the dream of nanoseismologists to master construction techniques at the molecular level.

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"This is the first experimental demonstration of a fractal computer which Winfree has been developing over the past 15 years," says Winfree. A Sierpinski triangle is a fractal pattern that is recursively built out of Os and Is. To emulate this algorithm in one-dimensional growth, the scientists represented written rows of binary "0s" and "1s" as rows of DNA tiles. Because of the crystal–some tiles stood for 0, and others for 1. To emulate addition, the sticky ends were designed to ensure that whenever a free tile tries to stick to tiles already in the crystal, it represented the sum of the tiles it was sticking to.

"The process was not without error, however. Sometimes DNA tiles stack in the wrong place, computing the wrong sum, and destroying the pattern. The largest Sierpinski triangle that grew contained about 200 DNA tiles. But it is the first time such this has been done, the researchers believe they can reduce errors in the future."

According to a key of the Caltech approach is that DNA tiles assemble into a crystal spontaneously. Comprising a knot of four DNA strands, each DNA tile has four loose ends known as "sticky ends." These sticky ends are what binds one DNA tile to another. A sticky end with a particular DNA sequence can be thought of as a special type of glue, one that only binds to a sticky end with a complementary DNA sequence, a special "anti-glue." For their experiments, the authors just mixed their DNA sequences into salt water and let the sticky ends do the work, self-assembling the tiles into a Sierpinski triangle.

In nanotechnology this "hands off" approach is known as "bottom up," a desirable property, and a common theme.

The goal of the research is the translation of an algorithm into a computer—into the process of crystal growth. A well-known algorithm for drawing a Sierpinski triangle starts with a sequence of Os and Is. It redraws the sequence over and over again, filling up successive rows on a piece of paper; each time performing binary addition on adjacent digits.

The result is a Sierpinski triangle built out of Os and Is. To create a fractal computer, the scientists represented written rows of binary "0s" and "1s" as rows of DNA tiles. Because of the crystal–some tiles stood for 0, and others for 1. To emulate addition, the sticky ends were designed to ensure that whenever a free tile tries to stick to tiles already in the crystal, it represented the sum of the tiles it was sticking to.

"The process was not without error, however. Sometimes DNA tiles stack in the wrong place, computing the wrong sum, and destroying the pattern. The largest Sierpinski triangle that grew contained about 200 DNA tiles. But it is the first time such this has been done, the researchers believe they can reduce errors in the future."

In fact the work is the first experimental demonstration of a fractal computer which Winfree has been developing over the past 15 years, says Winfree. A Sierpinski triangle is a fractal pattern that is recursively built out of Os and Is. To emulate this algorithm in one-dimensional growth, the scientists represented written rows of binary "0s" and "1s" as rows of DNA tiles. Because of the crystal–some tiles stood for 0, and others for 1. To emulate addition, the sticky ends were designed to ensure that whenever a free tile tries to stick to tiles already in the crystal, it represented the sum of the tiles it was sticking to.

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By doing this, comics risk “flirting with pretension”, but are making their way into respectable literary culture. On the other hand, comics and other forms of art remain different: “If you look at a painting and you don’t understand it, you think you’re stupid. If you read a comic and you don’t understand it, you think the comic is stupid,” Spiegelman said, evoking laughter in the audience. Because comics often depend on simplification and stereotypes, they can have harmful effects as propaganda, but can also be used for peace. Here, Spiegelman related his own experience with the first cover he drew for the New Yorker. Created shortly after race riots between the Jewish and African-American communities, the cover art shows a Jewish man kissing a black woman, representing his “dream of peace.” While the immediate result, according to Spiegelman, was that both communities got “really angry at me,” the picture demonstrated a comic’s ability to generate controversy and discussion, and also highlighted the personal conflict between his “underground artist sensibility” and the respectability of the New Yorker.

More recently, the September 11 attacks affected Spiegelman and his work. Recalling the World Trade Center towers collapsing behind him, he described his feelings of shock and confusion in the days that followed, as he “kept turning around to see if the towers were still not there.” Asked to create a New Yorker cover in response, he made a black-on-black page showing the silhouettes of the towers. “I was convinced af­ ter 9/11 that the sky was falling,” Spiegelman said, and as a result produced pictures showing his anxiety, including one depicting a nuclear explosion forth Fourth of July fireworks. Eventually, he gathered many of his post-9/11 pages of work into In the Shadow of No Towers, an “ongoing diary” of uncertain times.

In spite of his reluctance to draw political cartoons, the Bush admin­ istrations were on terror, which Spiegelman called a “bijection of the hijacking,” drew his criticism in these pages as well. The book was a “picture of the collapsing structures of the world around me,” he said.

Moving on to a history of comics, Spiegelman explained that these narrative drawings may have had their origins in picture win­ dows. Later, the first graphic novel appeared in the 1890s, consisting of a story interlaced with pictures. While the pictures and words have little meaning without each other, together they are able to compose a novel, he said. The comic as we know it originated on “Newspaper Row,” where Pulitzer and Hearst’s use of color printing presses led to the creation of Sunday comics.

The “bastard children of” comics such as “The Yellow Kid” or “The Katzenjammer Kids” often dealt with the lowly, vaudeville, or everyday life. The personal nature of these comics often led Spiegel­ man to “channel” them; for in­ stance, using the Katzenjammer characters in a political cartoon. Another comic of bygone days, "Krazy Kat", is a personal favor­ ite of his. The strip’s offbeat por­ trayal of the dynamics between a cat, mouse, and dog lends itself to evocatively “endless permutations,” Spiegelman said.

After World War II, the na­ ture of comics changed dramati­ cally, according to Spiegelman. Comic strips no longer had room for elaborate structures or “to be continued” storylines, and so four­ panel comics were born. This, Spiegelman said, was the time of the “last generation of great com­ ics”, among which was Charles Schulz’s “Peanuts”. As time went on, comic strips gave rise of comic books, many of which centered on super-heroic figures with a “very primitive energy.” Later, the satiri­ cal postmodern comic publication “Mad” showed that its cynicism could survive the age of television, it offered the disturbing message that “the media is lying to you, and we are part of the media,” Spiegelman said.

As the restrictions of the Com­ ics Code tightened on the world of comics, and in turn found a resurgence in underground comics. Here, artists could “break all the rules” and choose to express themselves in confessional or autobiographical pieces. A new generation of cartoonists reached readers through avant-garde comic publications such as Arcade and Raw magazines. It was the success of underground comics that gave Spiegelman the chance to draw Maus, he recalled. On one hand, his only goal in his work was to “make a large comic book that needed a book­mark”; on the other hand, he also wanted to be entertaining. Half-sincerely, Spiegelman la­ mented not using the post 90s tools to fight for world peace; because his quest for comics’ respectabil­ ity had succeeded so spectacularly. “While the world around me turned to total s—, comics are doing bet­ ter than ever,” he said. Now, as the world continues on its uncertain path, “it leaves me sitting among the monuments of one century, fearfully looking toward another,” Spiegelman concluded.

Girls, causing hurt feelings. This passive form of aggression could originate from the societal restrains placed upon girls. Either girls are nice, smiling, and liked by everybody, or they are labeled “mean.” There is no space for the ridicule and abuse that is given to a confident female who stands up for herself. Thus, fearful of being labeled “mean,” girls often turn to the more subtle and hidden form of bullying.

Such situations as these are fa­ miliar to most girls. However, they do not always end happily as the previous example did. In the case of Victoria, another girl shown in the video, societal rules lead her to exclusion from the group. “Welcome everywhere, the seems to belong nowhere,” the narrator said.

While appearing cute, pretty, and smart, Victoria was under a lot of pressure. Because of social problems both at home and at school, she started to fall apart both emotionally and academically. It’s especially hard for girls to express that they had to do every­ thing herself. The only person she felt she could open up to was her therapist. In her case, the so­ cial bullying between girls lead to deep emotional repercussions.

In the case of another girl fol­ lowed by the video, she resorted to suicide because of the social pressures she felt at school. Even though she had a good relation­ ship with her mother, and her parents were very involved in her life, they did not know that their daughter was undergoing such a traumatic time. One night, her mother found her daughter in the bathroom, unable to stop throwing up after consuming an entire bottle of TYLENOL. Though not physically harmful, the mind games played by girls can cause deep distress.

However, while most girls do resort to mind games, not all do. In 1997, a girl was murdered by what is believed to be a group which included only one boy. More and more girls have be­ come physically violent, which may be a product of greater societal acceptance of this view of females.

The film was directed by Patri­ cia Ivens Spcott. Lee Schneider served as executive producer. Dr. Nicki Crick, the first researcher to study the relationship between girls, and Rachel Sim­ mons, the author of “Goddess Out: The Secret Culture of Ag­ gression in Girls,” a New York Times best-seller, both provided commentary for the documentary. The film was released in 2003.