

A photograph of a theater stage with red walls and spotlights. The scene is dimly lit, with several bright spotlights hanging from the ceiling, casting a warm glow. The red walls of the stage are visible, and a person's shoulder in a light blue shirt is partially visible in the bottom left corner.

The Art of the Possible

He spent a lot of time as a kid hanging from the theater rafters. Holden Thorp '86 didn't know he'd be a brilliant chemist, but he was learning how to make science sing and dance. Now the University has shoved him to center stage.

by Bruce Egan

At 3, he appeared on stage.

At 13, he made a monster movie that was noticed at a film festival.

At 17, needing money for jazz records, he entered a

Rubik's Cube contest. He won in the adult division after practicing for a mere week.

At 18, he came to Chapel Hill pre-med (and an accomplished musician) and was told he was too smart to be a doctor.

At 29, he returned to Carolina to challenge students who had to take chemistry and those who wanted to.

At 31, he earned that special badge of honor in the academy: His research spun off a high-tech business.

Can he transform the Morehead Planetarium into a modern science showcase? May the first doubter step right up.



Holden as Tiny Tim in *A Christmas Carol* in 1967; with his Dad, Herbert Thorp '56 and brother Clay '90, in Paul Green's *Highland Call* in 1976; as the cowardly lion.



PHOTOS FROM THE THORP FAMILY

Holden Thorp: A Life in Four Acts

Act One

Time: Childhood.

Setting: Backstage.

Professionally, Herbert Thorp '54 was a lawyer. Obsessively, he and his wife, Bo Thorp '56, were dramatists. In 1962 they organized a small group of local actors into the Fayetteville Little Theater, now the well-respected Cape Fear Regional Theater.

Their son, Holden Thorp '86, didn't have a chemistry set; he had a front-row seat, growing up amid an ever-changing cast of characters who lived for greasepaint and hot stage lights. He got on stage at age 3, in the circus musical *Carnival*, but his real avocation was what's known in the theater as the techie. He spent a lot of his time as a kid hanging from the rafters of the theater, putting up lights. The light hanger is the one who stays after rehearsal — sometimes until 2 a.m.

"Then I'd get up and go to school in the morning. It was like a family business. I see a similar work ethic in my students who grew up on a farm. You have this immovable deadline, so you build up the gumption to get to that deadline."

Cut to chemistry class at Terry Sanford High School. Thorp took his teacher's computer, a Texas Instruments TI-99-4A, and taught it to make music. The teacher realized he had a precocious kid who also was driven.

All work and no play? Not exactly. "My friend and I made a monster movie," he said. "It got an honorable mention at the North Carolina film festival in the student category. It was an aluminum foil monster chasing us around in my backyard. We went through a lot of trouble, had credits and lights and everything."

The young Thorp may have homed in on lamps and circuits, but Bo Thorp saw something else happening: "He has a strong sense of theatrics, of the pathos, the drama of our lives — especially he sees what's funny, the ironies, the satire in everyday life."

Flashback: Thorp is 9, cast as Michael in *Peter Pan*. He cozies up to one of the Indians in the cast, four years his senior. "He was a really bad actor, but back stage he was a funny little kid," recalled Patti Worden, now Patti Worden Thorp.

As he approached his teenage years, it began to dawn on Thorp that when the company was putting on a musical, "the musicians were working a lot less than the light guy. I decided that music was worth working on. I had been playing the guitar, but not all that seriously, but when I was about 15 I started to get pretty serious. I wanted to play in the pit band in the shows. I started playing jazz guitar and some rock

on the side."

In 1981, he went with two buddies to the Berklee School of Music in Boston for the seven-week summer program. "Maybe [my parents] thought it was some sort of camp where we would have counselors and stuff. It wasn't. We lived in a dorm, on the corner of Mass Avenue and Boylston in Boston in the summer of 1981, all by ourselves. In today's world, I couldn't convince my wife to [let our kids] do that."

Thorp immersed himself, learning arranging and composing, but in the end he realized he wouldn't be pursuing a musical career. "There were all these really talented people at Berklee — 3,000 students, and 1,000 of them were guitar players. At that point, I had been trying to decide whether to go to music school or just play gigs and go to college later. It wasn't that I had a blinding St. Paul conversion. When I left, it was just obvious that I was going to go to a mainstream college."



The Berklee trip included the famous Rubik's Cube Incident. An avid collector of jazz records, Thorp read about a contest to see who could solve the Rubik's Cube the fastest. The prize was \$500, which would buy quite a few LPs. He practiced for a week. On the day of the contest, he caught a train to Framingham with his friends, then they grabbed a bus and traveled for another hour to the mall where the contest was being held. "We got there and there were about 2,000 people. The mall was closed by the time we got done, but I won the adult contest. Then we had no way to get back. The buses were shut down, so I had to get this vice president of Ideal Toys to drive us to Framingham so that we could catch

He often was in the theater until all hours.

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Holden Thorp

the train.” (He went on to the national Rubik’s Cube contest on TV’s *That’s Incredible*. He was, he says, “one of the slowest ones, but it was an amazing experience.”)

Returning home, Thorp pondered his college selection and career path. He swung all the way from guitarist to physician. Certainly pre-med at UNC looked appealing. “I still have my [Phil] Ford No. 12 shirt that I wore every time we played, that I had on in 1977 when we lost to Marquette, and I sat in my

bed and cried all night.” And Thorps have been coming to Chapel Hill in an unbroken line back to his great-grandfather.

In the end, he filled out only one application.

Jump to the future: “At the beginning, we made our whole livelihood off ticket sales,” Thorp said.

“And so if we wanted to do a play that might not be so popular, that we felt was artistically important, then, we had to do *Hello Dolly* the same season for us to do Beckett. I’ve come to approach my own career that

way. My intellectual goals are my intellectual goals. I believe that the research we are doing in chemistry is going to be important for a long time to come. But it’s written down in papers that only people with degrees in chemistry can understand. [So] you have to sell what you can sell.”

Act Two

Time: A little college behind him.

Setting: The lab. Always the lab.

Continuing on a pre-med track right through his junior year, Thorp found that graduating with honors would require a research project. Still unclear on what chemistry research was all about, he asked to join Tom Meyer’s research team, a mix of undergraduate, graduate and post-doc students, never imagining that the world he was about to enter even

existed. Meyer was a Kenan professor of chemistry and one of the University’s most distinguished scientists until he left here in 1999.

Torp explains: “Here was this big family, doing all these outlandish things — taking electricity and shooting it through mixtures of chemicals, trying to make new things, figure out new chemical reactions, how to take observations and extrapolate them to new knowledge. It just plugged in perfectly with music, doing lights in the theater and all these things I had done before, where you have this set of knowledge and tools, and you mess around with it in a creative way and try to conclude something new. You try to come up with a way to do it that nobody had thought of before.

“I’m sure they told me at the beginning that I was supposed to come in some minimum number of hours a week, but it didn’t matter. I showed up all the time. I got up in the morning, and if I didn’t have class, I went to the lab. Then I went to class and came back to the lab and hung out there until dinner time.”

He quickly grasped a fundamental of academic research, which he explains this way: “If you can’t be with the one you love, love the one you’re with. You come up with some goal, a good goal, and you go for it. We were doing electro-catalytic carbon dioxide reduction. We never really succeeded at what we were trying to do. But what you’re really doing is setting yourself up to find something that you can’t know what it was going to be. That’s a big part of what makes it exciting, and that’s the part that is hard for the public to understand.

“You get some big research grant, and you told the funding agency that you’re going to do *this*; it’s got some goal. Well, the goal is usually the only thing that you could possibly explain to the public. But the reviewers are really evaluating two things. One is the feasibility of getting to that goal, but then the other is the scientific fundamentals of what you planned, because if that’s planned properly, then you’re maximizing your chances of finding something unexpected that you don’t know about.”

Torp was hooked on chemistry research. Former Carolina trustee Bill Jordan ’65, who had mentored him on his college choice, weighed in again: “Torp, that’s not much of a decision. You’re just too damn smart to be a doctor.” He turned down the Duke and UNC medical schools, put all his worldly possessions in a Toyota minivan and headed west to Cal Tech to study with one of the giants in inorganic chemistry, Harry Gray.

While in Pasadena, Thorp kept his hand in music, playing in an all-scientist jazz band. And although engaged to another woman while at Cal Tech, Thorp had never gotten Patti Worden out of his mind. Patti



MICHAEL GORDON EDRINGTON/FROM THE THORP FAMILY

Torp in front of the Fayetteville library, late 1980s. He’d just received an Emerging Artist award. Opposite, with Patti Worden Thorp outside Venable Hall.



DAN SEARS '74

confided that they had always flirted with each other, talked at length about traveling together and were each other's confidants, even though "his brain scared me to death." On her way to Yale to pursue a master's in drama, she ran into Thorp back in Fayetteville. "I'll follow you anywhere," he told her, "as long as there is a good chemistry department."

Gray agreed Thorp needed to go with Patti back to the East Coast. Thorp finished his thesis at Columbia, then did his post-doc at Yale. They lived with a group of drama students on the beach. "I had the best of both worlds. Chemistry and [being] associated with drama."

Thorp began looking for a teaching position after Patti graduated in 1991. He landed an appointment at N.C. State, in part because of Patti's desire to return to North Carolina. He would stay there for two years, but nine months after arriving in Raleigh, he already had won a \$500,000 grant for research involving genetic therapy — quite unusual for a 27-year-old assistant professor just beginning his career.

Thorp's academic reputation grew quickly, and soon other institutions, including Berkeley and MIT, came calling. But they didn't have a chance when a position opened at Carolina. Holden and Patti were back on I-40, this time taking the short trip back home.

Act Three

Time: The present.

Setting: Lab. Classroom. Lab. Classroom.

Albert Einstein said, "If we knew what it was we were doing, it would not be called research."

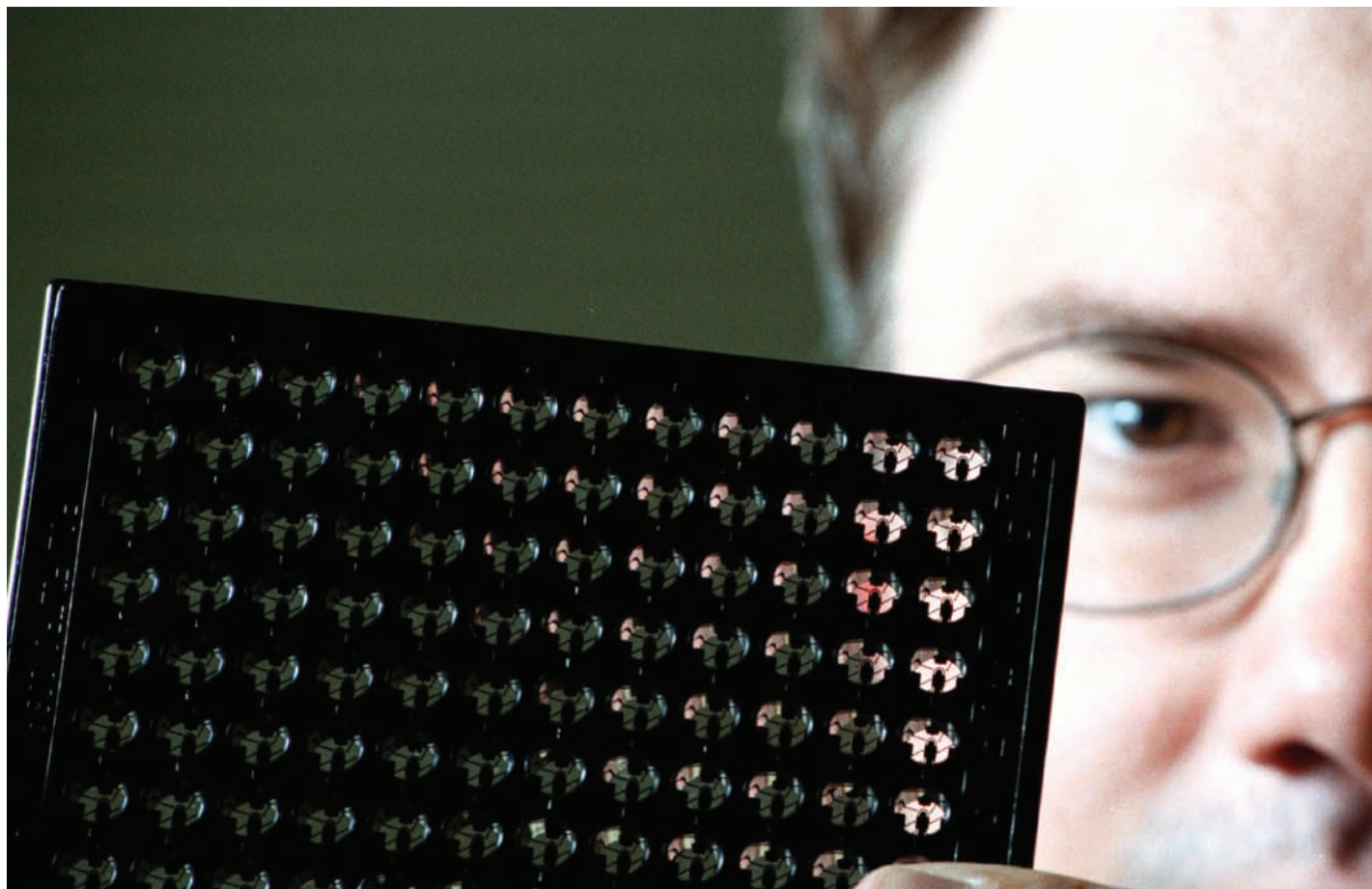
"So," Professor Holden Thorp said, "we do things to nucleic acids [DNA and RNA] that no one has ever thought of before. My research involves understanding the chemical reactions that DNA can undergo at a very detailed level. The way we do it is by reacting DNA with molecules that contain one or more of the transition elements."

The molecules Thorp works with have been studied by chemists for years, "but not with DNA the way we have done it. The DNA side of the reaction is where the surprises are. So we learn new things about the chemical reactions of DNA because we try really unusual reactions with these transition metal molecules."

And this is used for? "We learn new properties of DNA that you could not explain to lay people very easily, and we write these up in scientific journals, so that later some other person can use this information to do some other wild thing that we couldn't possibly think of now."

'He was a really bad actor, but back stage he was a funny little kid.'

Patti Worden Thorp



An early version of an expression analysis plate — a product for pharmaceutical companies — made by Xanthon, the company that spun off from Thorp's research.

Pam Nakhle '98 (PhD), a former student of Thorp's, now works at Xanthon.

Opposite, the teacher wows chemistry students (and students who have to take chemistry) with the electric pickle; and marches with the potato gun.

Remember, he warned you this can be a bit smoky to the public. But this, the lay person can understand: Fifty people hired into jobs, four buildings in Research Triangle Park, a profit-and-loss ledger. Xanthon is a springboard into the private sector for his basic research.

The company is developing processes to simplify the detection of the presence of nucleic acids in living cells — which could streamline the process of developing therapeutic drugs. Most tests for new drugs, Thorp explained, involve looking to see what potential drugs do to a particular molecule that you suspect might play a role in disease. With Xanthon's technology, you can do these experiments on whole cells and see how individual genes are affected by a candidate drug.

Thorp started the company with his brother, Clay Thorp '90, who had some experience in pharmaceutical venture capital. Holden was 31 at the time, Clay



27. They partnered with the co-founder of Sphinx Pharmaceuticals and hired a qualified CEO.

Xanthon regularly gets singled out as one of the best things that's going on around here. Chancellor James Moeser mentioned it in his State of the University speech. There is a special place in academic heaven-on-earth for those who, such as Thorp, can arm the

chancellor and other fund-raisers with tales of research that spawns private industry.

But Thorp is careful not to wander too far from the classroom. It's his center stage these days. His introductory chemistry classes are renowned for the videos he produced, the one about the potato gun and the one about the electric pickle. He stars in both.

The professor explains the principle of exothermic reactions by demonstrating a bazooka-type weapon made from PVC pipe that launches an Idaho spud



by igniting a vaporous mixture — grocery-shelf hairspray that contains propane. To drive home the power of the reaction, he splices in clips from *Star Wars*, making it seem as if Thorp Thorp, Rebel Alliance pilot, takes the shot, via the potato gun, that downs the Empire's Death Star.

In the other episode, Thorp takes off on a journey, from the campus all the way to the Food Lion in Carrboro, in search of a pickle into which he then inserts an extension cord, plugs it in and explains that the now-glowing pickle is illuminated thus because of the atomic transition of sodium in the pickle — a simple demonstration of the complex theory of electronic transitions for atomic orbitals.

The theatrical tricks seem to work. "Holden has an uncanny ability to resonate with students," said Joe DeSimone, Kenan chemistry professor. "Perhaps because he speaks their language and has their demeanor at times, but nonetheless, it is effective."

Miriam Heinrichs Zietlow, a fellow grad student at Cal Tech and now a technology manager at the Lord Corp., characterizes Thorp as a quick thinker who "is able to discuss a wide variety of topics in an intelli-



gent fashion. And he can have this discussion at a very intellectual level or on a layman level. I think it is this ability to communicate that is one of his scientific strengths.

"Along these same lines, Holden has a quick wit and good memory and is not afraid to use them. The nice thing is that he generally includes himself in the humor."

He's decorated, having received the Ruth Hettleman Prize for Artistic and Scholarly Achievement by Young Faculty in 1996, as well as Carolina's prestigious Tanner Teaching Award. Thorp also is a recipient of the Camille Dreyfus Teacher-

Scholar Award, the Presidential Young Investigator Award, an Alfred P. Sloan Fellowship, and the David and Lucile Packard Fellowship for Science and Engineering.

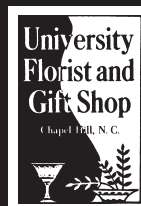
Thorp also is known for involving undergraduates in his research, running his research lab as befits his personality and his experience as a student. Eric Berg, a senior chemistry student who joined the research team, said the experience has been "really eye-opening for me. I am an undergrad, and I've been given the opportunity to experience the next level of chemistry."

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Joe DeSimone

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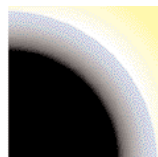
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Compared to having to learn the basics of chemistry, Berg sees the opportunity in the research group to be "at the cusp of the learning process, where you're actually making the discoveries."

Thorp, said Gray, his mentor at Cal Tech, is "an explorer with an incredible imagination. He is focused and he works very hard. He loves students, and they love him. He motivates those around him to do great science. That, in part, is why he is so successful."

"The advantage of a place like [Carolina] is that the upper limit of what's possible is the very, very top," Thorp said. "What we want to provide is an opportunity where the sky is the absolute limit, so that somebody from rural North Carolina without a lot of financial assets can come here and do the same things they would do at Harvard." He mentions a high school student who came to his office after she'd been admitted to UNC and said: "I want to start working in a lab now. I want to clone and do PCR [polymerase chain reaction] and molecular biology. And we're going to work out a way for her to do that."

(He did. Freshman Erin Heenan says she appreciates Thorp's approach to new UNC students at the ground level: "He's not overbearing — 'I'm the professor, you're the lowly undergrad.'")

Thorp points out that only about 40 percent of chemistry students sign up for undergraduate research. "If every student wanted to take research, we'd have a serious problem, because we can't accommodate all of them. Having said that, I don't think that means we can't get there. We just have to decide that that's something we want and keep working towards it."

Of course, he expects a lot in return.

"I think it should always be hard to get into Carolina. If you're a North Carolinian, it's an accomplishment and an honor to get admitted to this University. It is not a right. If we stop being selective, then we won't apply that pressure to people all over North Carolina." Thorp feels strongly about this. "There are people out in Iredell County who are doing well in high school because they want to come here. That's a motivating factor that no high school teacher in the world can apply, and we cannot dilute that. That's

driving the quality of our education system in a way that no amount of standardized testing, Smart Start or anything is going to do.”

Act Four

Time: The near future.

Setting: Among the stars.

The Morehead Planetarium recently observed its 50th birthday with aging analog star theater equipment, some 1950s-style astronomical exhibits and crowds that, while still wowed by sitting under the stars, aren't growing fast enough for some in the campus science community and in South Building. It's seen as a Carolina treasure that has dipped decidedly below its potential.

Familiar words and phrases leap from a brochure designed to spell out the ambitious and expensive new vision for the Morehead: "Economic growth in North Carolina ... increasingly connected to ... strong science and mathematics education Yet ... North Carolina ... falling behind other states in children's proficiency Center will feature state-of-the-art technology ... unwavering commitment to discovery ... groundbreaking work of Carolina researchers ... allows the general public ... to directly experience the wonder of science ... nanotechnology ... chemistry ... genomics ... virtual reality ... a model worldwide in science education."

And the chair of the steering committee for the Morehead Science Discovery and Outreach Center: Dr. H. Holden Thorp. What seems to have pushed him to the head of the class, as much as anything, is his knack for engaging even the people whose primary interest is not science.

"I think part of the general picture of Carolina, the picture that comes from the Charles Kuralt/Frank Porter Graham kind of picture of the University, doesn't include science," he said. "I'm not against that picture; there's just a missing piece. We want to raise the perception of UNC as a great science university in the minds of the public, and getting them to understand what the fundamentals of scientific research are all about is an important part of that because a lot of the areas in which UNC excels are in fundamental science."



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'We have 80,000 schoolchildren and 20,000 public [visiting] this facility every year. That's an incredible opportunity to tell people what we're doing.'

Holden Thorp



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'The work ethic that the arts teach is a spectacular one for young people and good preparation for totally diverse things.'

Holden Thorp

Is such an enormous undertaking worth it? "We have 80,000 schoolchildren and 20,000 public [visiting] this facility every year. That's an incredible opportunity to tell people what we're doing. If you take the long view that we want a public that 20 years from now is better educated about science than they are now, and you think about the fact that we have 80,000 8-year-olds coming through that door every year, 10 years from now they'll be able to vote. Ten years isn't that long on the life scale of a university. If we're able to communicate to them why we're here, what we're doing with their support, that's good for us."

Thorp believes a diverse group of faculty in fields such as journalism, communication, education and technology can contribute to and benefit by helping the center design its displays and messages. And he understands that making the public "science savvy" isn't limited to giving them a glimpse of the research that goes on in UNC research labs. Of equal importance will be communicating the social and ethical aspects of that science.

"How many people actually know what this whole stem cell thing is about?" He wants them saying, "I'd better understand this because I've got to think about whether I want people to know my DNA sequence, and whether I should be scared about that or not." Ultimately you want to have scien-

tists who can understand where people's fear comes from. It's only when you have the mixture of the two that you can have people working together to come up with solutions."

Between Franklin Street and Kenan Stadium, the University conducts much of its business out of the public eye. The Morehead Center will need to be, as the planetarium has been, Carolina's top hat and cane, its vaudeville act. Few know the master of ceremonies better than Patti Thorp, who says, all science aside, this is a good match because of the "theatricality about it, the whole presentation. I think that's one reason he has propelled himself in the scientific world, because he was brought up in this theatrical setting where communication was highly regarded as a skill."

We could drop the curtain now. But Thorp might lift it and crawl back downstage. When he isn't in the lab, the classroom or tightening his tie for the new administrative role, he's keeping his hand in music. He's written four musicals over the past 12 years, as serious as *One World, 1492*, as sublime as *Peace, Love and Rock and Roll* and *Polyester*. And you knew this was coming: He's got time for the kids and the church.

"The world knows Thorp as a professor, a researcher, a discoverer, a genius," said Timothy Kimbrough, rector at the Church of the Holy Family in Chapel Hill. "I know Dr. Thorp primarily as a musician



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and lover of children. When he plays the piano, often in ensemble with flutes, tambourines, fiddles and guitars, the youth seem to sing louder — there is something in his fingers that brings out the best in them. Traditional hymns are putty in his hands.

You will recognize the tune but barely. It can be hidden in a Broadway flourish, a blues riff or some standard rock 'n' roll progression. He puts new life into the ancient story the church has to tell."

"The work ethic that the arts teach is a spectacular one for young people," Thorp says, "and good preparation for totally diverse things."

Stage to black. House lights up. Tomorrow, another audience. 🏠



BRUCE EGAN is manager of Carolina's Information Technology Response Center, the campus computer help desk. His previous articles for the Review include a profile of actor Michael Cumpsty '82, an examination of faculty tenure and a report on UNC's Undergraduate Admissions Office's revival of the binding early decision option.



The musical scientist plays accompaniment to a Christmas pageant at The Church of the Holy Family in Chapel Hill. "I know Dr. Thorp primarily as a musician and lover of children," says rector Timothy Kimbrough. "When he plays the piano... there is something in his fingers that brings out the best in them. Traditional hymns are putty in his hands."

PHOTOS BY DAN SEARS '74



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