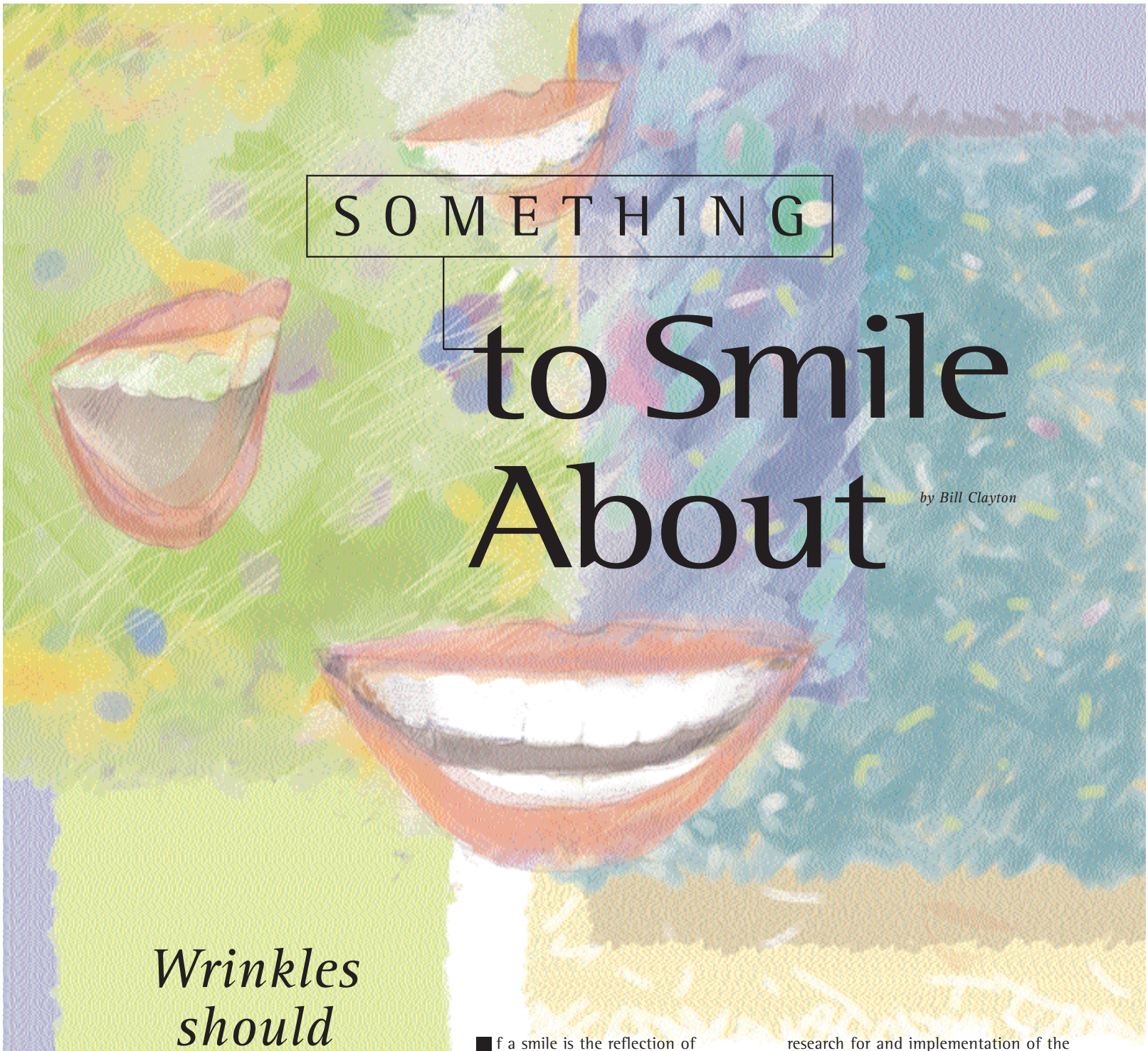


SOMETHING to Smile About

by Bill Clayton

Wrinkles should merely indicate where smiles have been.

–Mark Twain (1835–1910)

If a smile is the reflection of friendship and warmth, then dentists are the keepers of the flame.

Of course, for most of history a good smile was hard to come by. Tooth decay shows up in Cro-Magnon skulls. Sumerian texts made reference to "tooth worms." And as recently as 100 years ago, half of all American adults had no teeth. Today? Fewer than 10 percent of people over 65 are toothless, a statistic that speaks volumes about the many changes that dentistry and dental schools have gone through—and continue to experience.

More than 50 years ago, the U-M School of Dentistry pitched in with the research for and implementation of the fluoridation of Michigan's water, an event that probably has at least a little to do with those toothy smiles in today's over-65 set—not to mention significantly lower levels of tooth decay in schoolchildren and young adults.

This was a monumental step forward in preventive dentistry, which has gradually been replacing drill-and-fill as the strategy of choice. Yet more changes are taking place as dentists, researchers and educators embrace high technology: the computer, lasers and bioengineering. Dentistry is an art and science in constant change—a fact that demands ongoing, appropriate response from educators.

Dr. Dennis J. Fasbinder, clinical associate professor in the U-M School of Dentistry, showed how societal changes can affect dentistry and a dental curriculum. "Our patients are getting older, and as a result, we're seeing more and more people with more and more chronic diseases. We have a lot more medically compromised patients

Americans may have no identity, but they do have wonderful teeth.

—Jean Baudrillard (b. 1929), French semiologist

coming into dental practices now. We have to prepare our students to understand the medical aspects of those patients.

"For example, we're seeing a lot more patients who've had cardiac surgery—valve replacements, bypass surgery. So we have to be knowledgeable about what that means to the patient. For instance, after heart surgery, there's a period of time when you don't want to deliver dental care."

Dentists also are discovering that, in some cases, the tail wags the dog. U-M School of Dentistry Dean Bill Kotowicz said that there seem to be "linkages between oral infections and systemic health, particularly in things such as active periodontal disease, which is turning out to be a factor in cardiovascular disease, diabetes and even low birth weight. Organisms from oral infections are showing up in the plaque that's in the heart and other vessels. So, the linkage between the oral infection and cardiovascular disease might be as important or of greater importance than one's cholesterol count."

It seems that the more researchers discover, the more they ... discover. One door leads to the next. And researchers at the U-M School of Dentistry, which celebrates its 125th anniversary this year, are opening new doors every day.

The New Dentistry—A Product of Research and Technology

Early dentists used the crudest of tools—picks and two-edged cutting instruments that they twirled between their fingers, enamel scissors and, eventually, a "dental foot engine" adapted from a spinning wheel to turn a drill. A far cry from today's dentistry.

These days, seeing CAD/CAM equipment in dentists' offices is as unsurprising as seeing it at automotive workstations. Using the CAD/CAM technology, dentists design restorations, mill them out and cement them in place in one appointment, whereas previously this procedure took two or three visits.

Dental research has come a long way, too.

The U-M School of Dentistry, a long-time leader in the development of traditional biomaterials for the repair of dental tissues, underscored that position when Dr. Peter Ma, assistant professor of biologic and materials sciences, recently took a giant step in the emerging fields of regeneration biology and tissue engineering.



Bill Kotowicz

Ma focuses his work on the development of materials that have dental and medical applications. Some of these substances are restorative dental materials that, in the near future, dentists will use to replace the structure and function of damaged or diseased tissues or organs.



Peter Ma

The ability to replace damaged tissue and bone with living material has far-reaching, practical importance. For example, today, if a child receives an implant to replace damaged bone in the jaw, the implant won't grow as the child grows; eventually, doctors will have to replace it. However, Ma's research demonstrates that, someday soon, doctors will be able to use living tissue to replace the damaged bone. The result? The new tissue would grow right along with the child.



Dennis Fasbinder

This type of research demonstrates that, in addition to being innovative, science is compassionate: What could be more tenderhearted than saving an injured child from additional misery?

Ma's work recently won a prestigious Dupont Young Professor Award—the first time in the award's 25-year history that a faculty member at a dental school received the honor.

In the Works

The U-M School of Dentistry has one of the most active and accomplished research programs in the country. Here's a rundown of just some of the notable projects currently underway and the people working on them.

David Mooney: creating replacement body tissues, grown from a combination of biodegradable artificial materials and living cells.

Brian Clarkson: the role of dentin phosphoprotein (dpp) in dentin remineralization

Renny Franceschi: gene regulatory mechanisms controlling bone formation and a gene-therapy approach for engineering craniofacial bone

William Giannobile: gene therapy for reconstructing periodontal tissues

William O'Brien: strengthening mechanisms for dental ceramics and evaluation of appearance properties of dental materials

R. Bruce Rutherford: protein, cell and gene therapy approaches to regeneration of oral and dental connective tissues

Martha Somerman: adhesion molecules; development and regeneration of connective tissues

Walter Loesche: the role and treatment of anaerobic bacteria responsible for advanced periodontal disease.

Michael Ignelzi: molecular and genetic basis of craniofacial development

Paul Krebsbach: cell and molecular biology of mineralized tissue

Laurie McCauley: molecular and cellular biology of osteoblasts

Robert Bradley: neurophysiology of central taste circuits, functional regeneration of sensory nerves through implanted electrodes

Charlotte Mistretta: developmental neurobiology of taste organs and central taste circuits

Christian Stohler: jaw motor function and orofacial pain

Cun-Yu Wang: neo-adjuvant therapy of oral cancer by inhibiting nuclear factor-B (NF-B) Tumor Necrosis Factor-alpha (TNF-A)

John Drach: discovery, mode of action and metabolism of antiviral and antineoplastic drugs

Searching for a New Dentist

It happens all the time. People pull up stakes, move to a new location and leave their dentists behind. Or they simply want to make a change, for whatever reason.

So, how do you find a good dentist? Dr. Jerry Gordon, a general dentist with a private practice in Bensalem, Pa., writes a weekly newspaper column covering a wide range of dental issues for the *Bucks County Courier Times*. He suggests a number of methods.

If you have friends or family in the area, ask if they're happy with their dentist, then give him a try. Ask new neighbors or coworkers if they're satisfied with their dentists. You also can make a call or search the Internet to find a dentist who's a member of your local dental society and your district's branch of the American Dental Association. And, if all else fails, let your fingers do the walking through those trusty *Yellow Pages*.

Once you have the names of a few dentists in your area, interview them to find the one you feel most comfortable with. Check the walls for credentials and continuing education certificates. Lastly, ask to see "before" and "after" pictures and testimonial letters. Dentists who have good reputations in the community and take pride in their work should have no problem sharing most, if not all, of these items.

Each of these methods can be useful, but ultimately your choice should come down to three key elements that must exist for the dentist-patient relationship to work: an open line of communication, confidence in his or her ability and, above all, trust.

The School of Dentistry's research covers a wide spectrum (see "In the Works," p. 25). Some projects focus on disease prevention, salivary gland function and the impact oral diseases have on systemic health. Other programs find neurobiologists collaborating with colleagues in the neurosciences, medicine and engineering to study various aspects of taste, touch and pain within the mouth and about the face.

"The changing technology will be ongoing," Kotowicz said. "I expect it'll be happening at an even more rapid pace. We have a more educated public, so the demand for the new technology is going to be great—perhaps even greater than it is now. Incorporating the new knowledge and what we're going to be gleaning from the explosion of information in genomics is going to be critical to dentistry and dental education. I don't have a crystal ball to know exactly how that's going to impact our profession directly. But I know that it's going to change. There's no question about it."

There are people who laugh to show their fine teeth; and there are those who cry to show their good hearts.

—Joseph Roux (1834–86), French priest, writer

Reaching Out

Another notable change occurred when the dental school committed itself to an ambitious outreach program, partnering with five community clinics around the state to provide care to Medicaid patients, patients without insurance and others with limited means to pay for dentistry.

Again, it's a statement about the compassionate nature that a large institution can exhibit if it has people with heart. Kotowicz spoke for a lot of folks when he said that the School of Dentistry wants to "recognize that there's an underserved population we can't attend to from within these four walls."

News of charitable acts travels fast. "We're having a hard time keeping up with the demand," Fasbinder said. "So we're sending our dental students and some of our graduate residents out to these clinics to become extra providers. Specifically, we're sending those in the Advanced Education in General Dentistry program, the Pediatric Dentistry program and the Oral and Maxillofacial Surgery program. Now we can increase the care in these areas and, at the same time, give our students some very valuable clinical experiences."

Of course, there's a flip side to the school's outreach program: The students still have to attend to their coursework at the dental school. So the question becomes: If the school is going to send students to community clinics around the state of Michigan, how do they get the coursework if they're not physically in class? The school's response to this dilemma was a virtual brainstorm.

Virtual Dentistry

Conducting dental courses for students has always presented logistical problems: Instructors had to put 35-millimeter slides together, copy manuscripts and put everything in the central office so students could check things out. It was a system with distinct drawbacks, especially for students who weren't on campus. Fortunately, Fasbinder and Dr. Jeffrey Shotwell, associate professor of biologic and materials sciences in the division of prosthodontics, had already begun to address the problem.

Several years ago, following a flash of creativity, they joined forces with the technical support people from the school's education resources group and, together, manufactured patient cases as learning tools and put them on the Web—as if each case were a real patient. Using a password, students could open up the Web site and see a patient's dental records, health history, radiographs, 35-millimeter slides and other charting that would accumulate over the course of several examinations.

From all appearances, Fasbinder and Shotwell had simply scanned a patient's file and put it on the Web, but appearances were deceiving. They actually used records, photos and radiographs from a variety of patients, creating a "virtual patient" whose case presented specific problems for the students to pick up on. So, when students went to the site, they looked at all the information that they might have gleaned from doing the exam. Then they made their diagnoses, listed the problems the patient had and created a treatment plan. They submitted their work electronically; Fasbinder and Shotwell read everything online, making it for all practical purposes a paperless course.

The virtual patient has given students access to cases, 24 hours a day, seven days a week, wherever there's a computer with an Internet connection. For students in the outreach program, it's been just what the doctor ordered.

"The students have really excellent access to the information to develop their plans," Fasbinder said. "But what's really nice as a faculty person is that I can read all their treatment plans electronically. And then, when I go to the course, I present the same case—our lecture rooms are connected to the Web—and because

I had very good dentures once. Some magnificent gold work. It's the only form of jewelry a man can wear that women fully appreciate.

—Graham Greene (1904–91), British novelist

I've had the chance to read their electronic submissions, I know where they're having problems in doing the treatment plans. So I can appear as if I just know where the problems are. But it's really because I get such good feedback from the students."

The virtual patient program, formally known as the Comprehensive Treatment Planning Internet Site, recently received the Computerworld Smithsonian Award. The site is now a part of the Smithsonian Institution's Permanent Research Collection on Information Technology, housed at the National Museum of American History.

All of which proves that a good idea, a desire to provide the best educational experience possible, and the freedom to bring that idea to fruition are the hallmarks of a school that's dedicated to and enthusiastic about its mission.

Progress—A Matter of Initiative

The School of Dentistry also has been active within the U-M community, particularly in the University's Life Sciences Initiative, (*Michigan Alumnus*, spring 2000) a campus-wide effort to expand, enhance and integrate life sciences

If you have only one smile in you, give it to the people you love.

—Maya Angelou (b. 1928)

education, as well as generate new research, technological advances, opportunities for student participation and new ways of thinking.

Kotowicz said that the School of Dentistry is "a player in the life sciences. The head and neck have all of the tissues that are in any other part of the body—there's skin, there's mucosa, there's bone, there's muscle, there's nerve—so our researchers are involved in just about any research you can think of. Everything that's done, we do, too. We simply put the emphasis on the head and neck."

The Life Sciences Initiative addresses the growing need for each medical discipline to treat the whole body. This, in turn, demands that health professionals expand their knowledge base, share information and learn to work together.

The School of Dentistry has been involved in interdisciplinary research for years. It's not uncommon for a member of the school's faculty to have training in more than one of the major biomedical research disciplines such as biochemistry, molecular biology, physiology, microbiology, neurology, biomaterials, biomedical engineering, tissue engineering, epidemiology and even psychology.

This cooperative effort, Kotowicz said, "has produced changes that are going to impact our research, our curriculum and our patient-care delivery. And to some degree, they're going to add another dimension to our mission, which is service."

May your smile be the last of you I see.

—An Irish farewell

In dentistry, as in other scientific disciplines, change begets change. But in a world that's long on ideas and short on resources, change is hard. However, with the cooperative effort of the Life Sciences Initiative, the mutual benefits of the outreach program, and the inventiveness and commitment of its instructors, the School of Dentistry is moving ahead confidently—and producing a lot of brilliant smiles. UM

Open Wide

A toothbrush and dental floss are most people's weapons against tooth decay and periodontal disease, but finding the right toothbrush isn't as easy as it seems.

First, it's important to know that there isn't a single, best toothbrush. They come in a rainbow of colors. Some have more bends than a pretzel. Some even have colored bristles that let you know when it's time to get a new brush—all terrific attributes. But there are only a few things you really have to consider in making your choice.

1. Find a toothbrush that reaches every surface of every tooth comfortably. This might require a "pretzel toothbrush" with bends in the handle. But a "$1 special" that's as straight as a board will work fine if it reaches the backsides of your back teeth.

2. Select a toothbrush with the proper bristles. You might not even know that different toothbrushes have different types of bristles. But they come with ratings of soft, medium and hard. The hardest-bristled toothbrush and frantic scrubbing won't necessarily produce cleaner teeth. A hard-bristled toothbrush, used incorrectly, might even cause your gums to recede or remove the surface of your teeth, leaving a V-shaped notch. Most often, it's best to choose a medium- or soft-bristled brush and use it gently.

3. Get a toothbrush that's approved by the American Dental Association. This ensures that the brush has undergone ADA research and testing and is a quality product.

