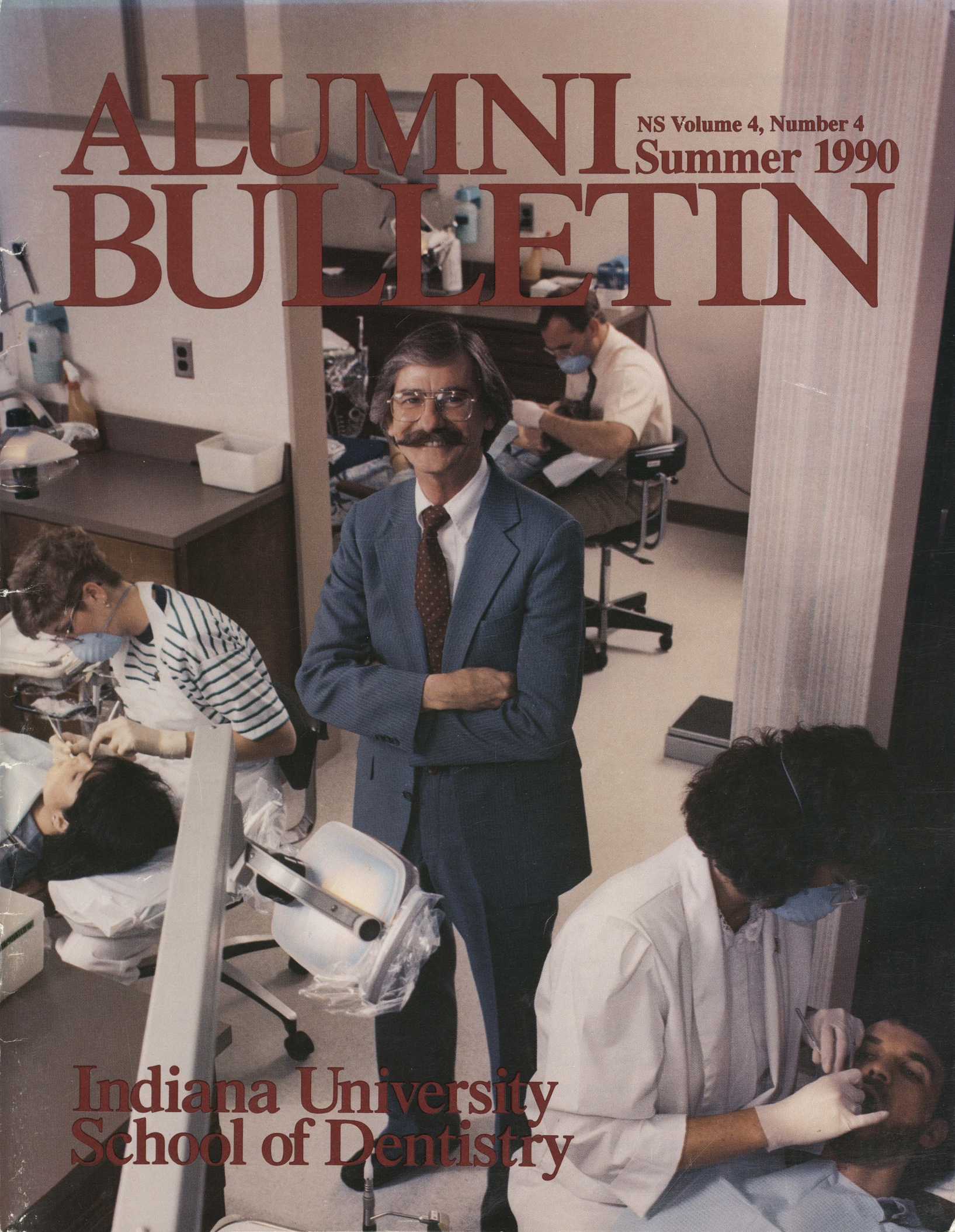
ALUMNI BULLETIN

NS Volume 4, Number 4
Summer 1990



Indiana University School of Dentistry

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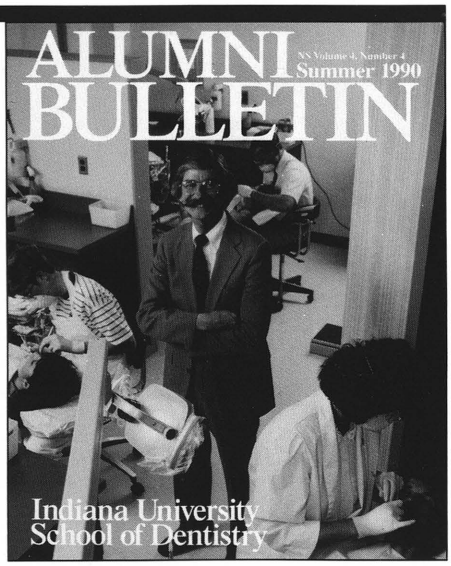

On the Cover

The little 'house' has a big name—the IUSD Oral Health Research Institute—and a big team—some 150 people pool energy and resources to produce an impressive body of work in an organization that has been regarded as one of the nation's leading research sites for nearly two decades. Four members of the OHRI team shown in the new section of the Institute's clinic are Director George K. Stookey (center) with dental hygienists (foreground) Jody L. Crawford (ASDH '80) and Twyla S. Beaty (ASDH '88) and project dentist Michael C. Beaty (DDS '90). For more on the story, see page 2. (Cover photo by Rick Baughn, IUPUI Learning Technologies)

The ***Alumni Bulletin*** is an Indiana University School of Dentistry publication directed to members of the IUSD alumni. There are four issues each year: Fall, Winter, Spring, and Summer. Material included herein does not necessarily represent the official position of the School. Editorial office address: Indiana University School of Dentistry, Room 104, 1121 West Michigan Street, Indianapolis, IN 46202; and telephone: 317/274-5405.

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Publication member of the American Association of Dental Editors

Notes from the Dean's Desk

I am pleased to report that a strong first-year predoctoral class for the 1990-91 academic year has been selected. Through the Office of Student Affairs, the Admissions Committee identified 85 first-year students and an alternate list of qualified candidates. The national average of available students has shown a slight increase for the first time in many years, and Dr. Robert Bogan and his staff were able to draw upon a healthy applicant pool. Family dentists and dental hygienists who project a positive attitude about the profession of dentistry were linked to our recruitment program. Practitioners are still the best source for finding eligible students.

Because of the critical manpower shortage, the class size for dental hygiene was increased by 10 students this year. More hygiene candidates took the recent licensure exam than did DDS graduates. In contrast to the shrinking number of students enrolled in dental education nationally, our school continues to draw an adequate number of qualified individuals, and we project that a sufficient number of dental professionals will be trained to adequately supply the state of Indiana until the end of the millennium.

Graduate dental training at IU continues to expand—the program is one of the largest in the country. It awards MS, MSD, and PhD degrees in most of the clinical and basic sciences and attracts many research scholars from the international arena. Research projects in biomaterials, clinical product testing, and other laboratory studies are conducted within most of the specialities, with the data becoming course material for faculty and students alike. This is also the way new concepts of dental treatment are developed for continuing education courses.

The departments of orthodontics, periodontics, and endodontics are evaluating numerous new products and treatment concepts of importance to practitioners. We're also on the leading edge in the area of infection control, with faculty who are prepared to teach compliance procedures for the new laws. New directions being taken within the dental health-care system are diverse and tremendously challenging for all alumni. Much of the funding for dental research today is targeted at special programs formed by dental faculties in conjunction with scientists from other related schools. An example is the new IUPUI Biomechanics and Biomaterials Research Center, which will be directed by a team of scientists from dentistry as well as the schools of medicine, engineering and technology, and science. A primary area of study for the group will be physiology of bone, including reaction of bone to aging, stress, dental implants, orthopedic appliances, and tooth movement. Networks of experts such as this one have special appeal to funding agencies, and similar combinations of researchers are being employed to expand other research areas in dental subjects.

Enrollment figures on the IUPUI campus surpassed 26,000 this year. The rapid growth has been advantageous in many ways for the School of Dentistry. New research institutions and the developing schools of engineering and science are available for collaboration. Because the School of Dentistry is a free-standing point of attraction on this interesting, busy campus (more cars enter and exit IUPUI daily than anywhere else in the county), our facilities have recently been re-landscaped. An attractive building and grounds located in the heart of the campus serve to reflect—and strengthen—our professional standards.

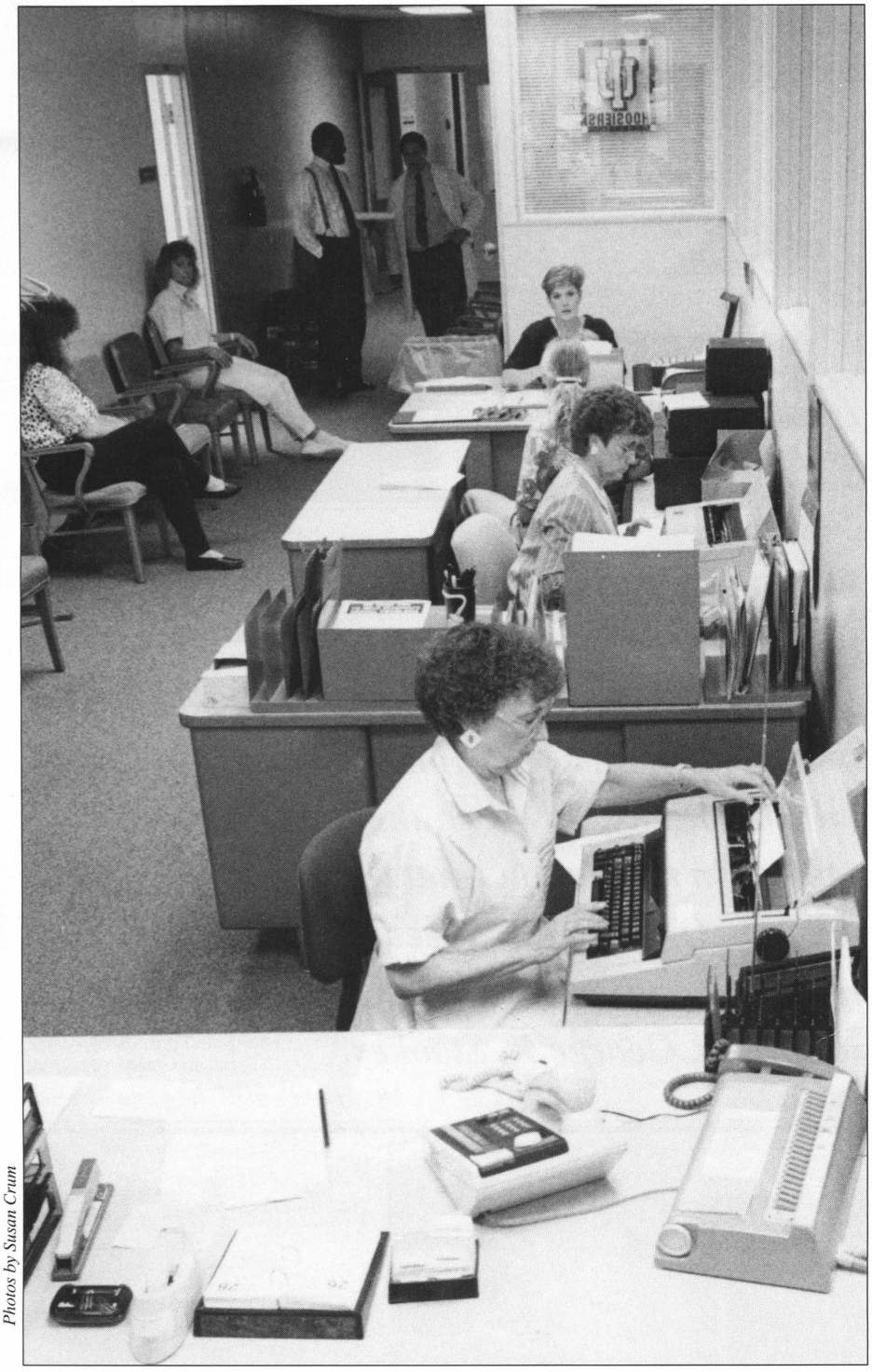
Special networks in research and leadership are key elements in education today, and dentistry must be a full partner at the university level. The stepping stones for the future of dental health care are being laid by special research teams located at a few universities around the country. We at Indiana University are proud to be among them.

H. William Gilmore

A Little 'House' with Big Talent

It is often overlooked by passersby and easily overshadowed by more imposing structures on the IUPUI campus. To the nation's dental community, however, the little "house" on Beauty Avenue has earned in reputation what it lacks in size. The **Bulletin** *takes a look at the Oral Health Research Institute, long regarded as a leading center for preventive dentistry research, and at the Institute's director, Dr. George K. Stookey.*

Story and photos by Susan Crum



Photos by Susan Crum

Researchers, subjects, sponsors—they pass through the Institute's narrow reception area by the thousands each year. Amidst the bustle, staff members manage to focus attention on the inevitable mound of paperwork and related details that accompany each study. Front to back: receptionist Jean A. Hinman, recruiter Marcia L. Connell, data recorder Dawn R. Andres, and dental hygienist Twyla S. Beaty.

Published Summer 1990

The pace at the Oral Health Research Institute is always swift. (Unless, of course, you count the times when a grant application deadline is looming up—then, it is frantic.)

"Valparaiso dentist Scott Polizotto once said that the Institute was the only place he knew of where research is treated as an emergency," Dr. George K. Stookey, the Institute's director, says with a laugh. "It's true—the pace around here is go, go, go."

The Institute, located on the west side of the School of Dentistry, has served as the school's core facility for preventive dentistry research for nearly two decades. A self-supporting body known in part for its top-notch performance as a testing center for a wide variety of dental products, the Institute is funded (including the salaries of its employees) primarily by grant allocations from agencies such as the National Institutes of Health and the National Institute for Dental Research, and by contractual agreements with manufacturers and other sponsors. "We are involved with both long and short-term laboratory and clinical studies," says Dr. Stookey. "The NIH funded the universities of Michigan, Alabama, and Pennsylvania to establish dental research centers, but ours is the only one developed without government funds. Today, we must generate about $6,000 a day just to keep the shop running."

It is a challenge that Dr. Stookey has thrived on almost for as long as he can remember.

His ties to dental research began in Bloomington in the summer of '57, when he wandered into the office of Dr. Joseph C. Muhler—a dental school faculty member whose research with stannous fluoride, being conducted with two chemistry professors, was on the verge of bringing world-wide acclaim to Indiana University. "I had just graduated with a degree in

chemistry and was going to go to dental school in the fall," Dr. Stookey recalls. "I needed a job for the summer, so I went down every corridor of the Chemistry building, from door to door, asking every professor for a job. I wasn't having any luck. But, the last door on the top floor belonged to Dr. Muhler's office. He didn't have time to talk, but told me to come back in a couple of days. When I did, he hired me to do fluoride analyses in his lab at a dollar an hour."

This was at the time, of course, when Dr. Muhler was in the midst of his clinical studies with the stannous fluoride formula that became the active decay-preventing agent in Crest toothpaste. "In 1957, when they began marketing Crest, there was a disclaimer on the tube: Not for Use by Children," Dr. Stookey explains. "We were doing metabolism studies of fluoride and also safety studies so that the disclaimer could be eliminated."

A year later, when the dental school's basic science faculty moved their classes from the Bloomington campus to Indianapolis, George—deciding that the lure of research was momentarily greater than the lure of dental school—stayed behind to look after one of Dr. Muhler's labs and to take graduate work in the chemistry department. When he joined the others at Indianapolis in 1959, he moved the lab with him. "I mean that literally," he says with a smile. "I hauled the rats in their cages, and everything else, in my car! It took several trips."

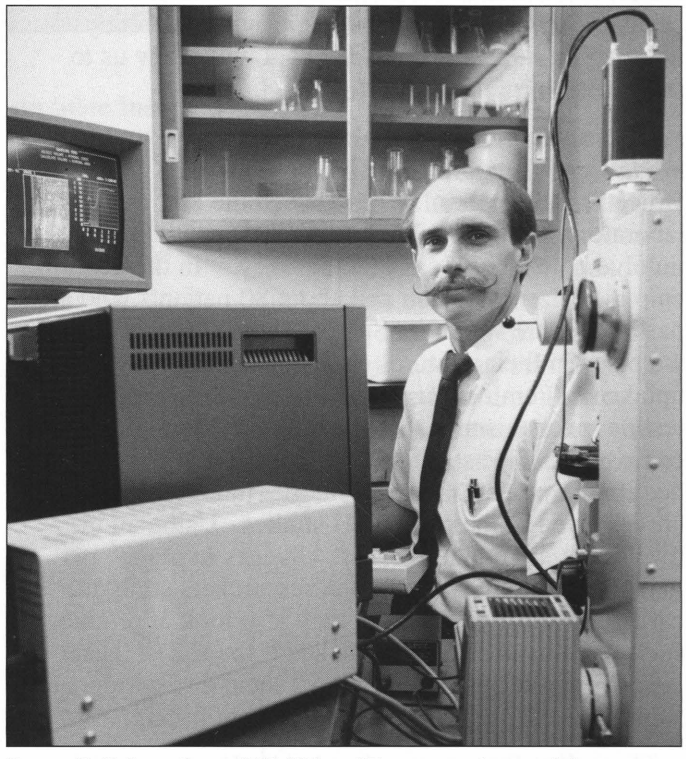
In Indianapolis, George worked full time in the lab as a predoctoral fellow while struggling to make time for graduate courses in medicine and dentistry. After a few years of this, he decided to heed advice given to him early on by Dr. Muhler. "He used to say to me, 'You can do more for humanity if you stay with me in research than you will ever do as a dentist,' " says Dr. Stookey. "I didn't think too much about it then, but looking back, I think that he was probably right. I love research—the quest for answers—and the results of research with fluorides ultimately has led to the decreasing need for dentists to do restorative work."

The American Dental Association gave Crest provisional approval in 1960, and full approval in 1964. "By 1964 Crest had about a third of the dentifrice market," says Dr. Stookey. "There had been a number of clinical trials with fluoride dentifrices before, but they had all failed because the fluoride was inactivated by the abrasive in the toothpaste. It didn't work just to add the fluoride. Three IU researchers—Dr. Muhler and chemistry professors Harry Day and William Nebergall— held the patent on the first successful formula, which demonstrated that heat treating the abrasive could make it compatible with fluoride. Indiana University made a contractual agreement with Procter and Gamble Company to use the patent. Royalties from the sale of Crest were used to build this facility, which was originally named the Preventive Dentistry Research Institute—and often referred to as 'The House That Crest Built.' The patent expired in 1967 and there has never been any of that kind of income since."

When the Institute was dedicated in 1968, it provided an opportunity for all preventive dentistry researchers to be housed under the same roof for the first time. Researchers previously had been scattered just about everywhere: in Bloomington and at the medical sciences building, dental and medical schools, and State Board of Health.

In 1972, when Dr. Muhler moved the Preventive Dentistry Research Institute to the Fort Wayne campus, the facility on the IUPUI campus was renamed the Oral Health Research Institute, with Dr. Ralph W. Phillips appointed as director and Dr. Stookey, a 1971 graduate of the PhD program in preventive dentistry, as associate director. Dr. Stookey was named director in 1981.

Today, the Institute is virtually bursting at the seams of its modest-sized quarters (and, in fact, has had to house one of its newest programs across the street at the dental school). The Institute employs about 50 full-time faculty and staff members; their work is supplemented by nearly 100 individuals who are employed on a temporary basis, depending upon the number and size



Bruce R. Schemehorn (MS '85), a 17-year employee of the Institute, oversees contract testing as assistant director of preclinical research. He is seated behind a computer-assisted microradiograph image analyzer that permits evaluation of density changes in hard tissue specimens.

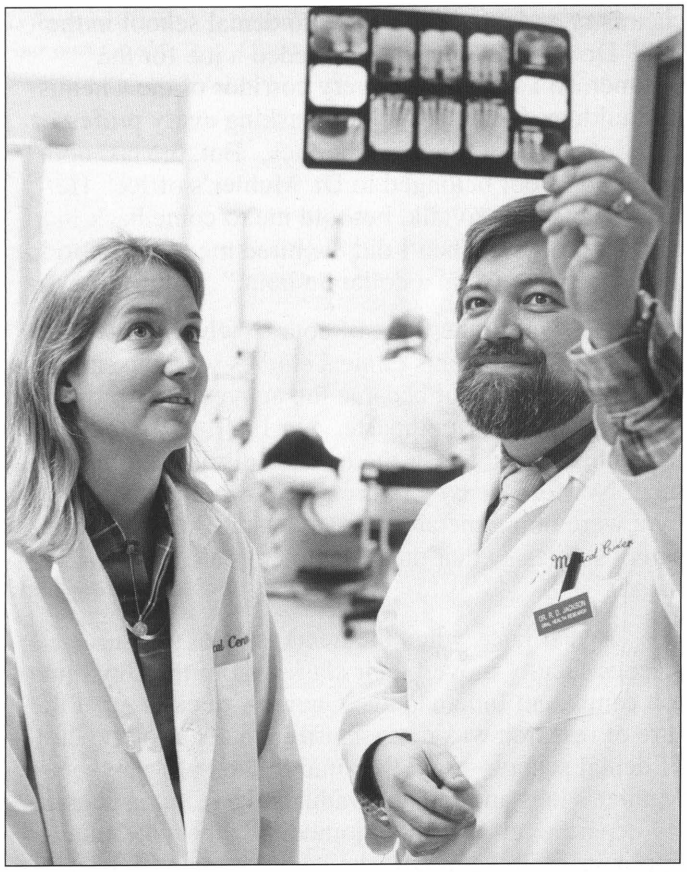
of the studies being undertaken at any given time. The organization is divided into five components:

• ***The clinical research group***, headed by Dr. Bradley B. Beiswanger. "We started out with four operatories, added five more two years ago, and currently have plans to add another five," says Dr. Stookey. "Often we are doing clinical studies from seven in the morning until six at night, six days a week. It's difficult to keep up. In the last year we've been doing studies on how to make tartar control products more effective. We also have been working with an improved toothpaste that contains fluoride as well as anticalculus and antimicrobial agents. We recently completed two extensive short-term clinical trials with outside funding of a quarter of a million dollars. It's an extremely active group and, away from home, members of our clinical faculty are well known as guest examiners at clinical sites all over the United States and Canada."

• ***The preclinical research group***, directed by Dr. Ann J. Dunipace. Among the laboratory's many studies are product comparison evaluations, tests for product abrasion, analyses pertaining to smoking cessation, and in vitro assays evaluating remineralization and demineralization of enamel. A number of projects examine fluoride from many perspectives. "We look at fluoride for its safety, its metabolic and pharmacologic features, and the mechanism that gives it the ability to prevent caries," says Dr. Stookey. "Root caries, secondary caries, and occlusal caries are the major restorative problems today. Our laboratory group is currently working on developing models that will allow us to study secondary caries."

• ***The in situ denture chip and telemetric plaque pH models group***, coordinated by Dr. Kichuel K. Park and Bruce R. Schemehorn. "In between the clinical and laboratory groups, we have two major programs that involve both areas," says Dr. Stookey. "In the denture chip model, we have on call about 80 patients who are partial denture wearers. Special enamel specimens that we place in their dentures enable us to study fluoride uptake and remineralization. It is a very important testing mechanism in that we can evaluate fluoride and compare fluoride systems prior to, or without having to do, clinical trials." A much smaller number of patients are involved in the plaque pH studies. Using an in-dwelling electrode to measure changes in plaque pH that are recorded by computer, researchers study the cariogenicity of food items; they also look at products such as gums and lozenges to see if the use of these agents immediately after eating a meal or a cariogenic substance can keep the plaque pH from falling.

• ***The cell culture group***, headed by Dr. Yiming Li. This newest research branch represents the Institute's foray into biomedical science. Cells grown in a well-defined and highly controllable artificial environment



Clinical research associates Dr. Marita A. Tuohy (DDS '87) and Dr. Richard D. Jackson (DMD '79, University of Louisville) in the newest portion of the OHRI clinic, to which five operatories were added two years ago

are being used to explore a variety of topics, including the biological effects of fluoride, the dental pulp's response to dental materials, and bone cell differentiation. A chief advantage of cell studies is that they often can be designed and implemented in lieu of studies that require the use of animals. Some of the in vitro cell culture work parallels in vivo research in the dental school's bone research laboratory. Temporarily housed in the Department of Oral Pathology, the cell culture laboratory will eventually be relocated to an area on the fourth floor of the dental school once used as a television studio.

• ***The animal research facility***, supervised by Janice M. Warrick. Also located in the dental school building, the animal facility is the only one within the IU system to be fully accredited by the American Association for Accreditation of Laboratory Animal Care (the medical school is currently seeking accreditation of its new facility). "Our facility is unusual," says Dr. Stookey, "because the technicians who care for the animals also conduct the contract studies. In many other facilities, investigators are brought in to do the experiments. Our animal facility does probably $300,000's worth of research annually for outside agencies, above and beyond the work related to NIH grants and other kinds of programs. Typically, I develop a protocol with one

of the faculty members, and then once a protocol is granted, the technicians run the study and come back to us with the data." Recently, the animal research group's work was instrumental in the development of tartar control milk bones for dogs, a product now being marketed nationally, and the group is currently at work on a series of other pet foods and snacks that focus on the oral health of animals. Dr. Stookey gave up the chairmanship of the dental school's animal care committee last year in order to head the IUPUI and the University-wide Institutional Animal Care and Use committees. "Our assignment is to make sure, at the institutional level, that policies relating to proper animal care are being followed, and that the university is in compliance with all federal regulations regarding humane care and treatment of animals in both research and teaching."

The Institute's research program has offered a wide assortment of challenges over the years, usually revolving around the never-ending race to meet unwavering deadlines while also diligently following all governmental regulations and guidelines. On occasion, Dr. Stookey has been known to beat the deadline by jumping on a plane to deliver documents in person.

"When we want to do a study involving a non-approved drug, we must file an IND (investigational new drug application) with the U.S. Food and Drug Administration," he says. "To do that, you write your protocol, develop all the safety data, and submit a big packet of compiled information to the FDA, along with a request to do a study. If it's approved, you do the research and report back. If you do enough studies, you are in a position to file an NDA (new drug application), and if that is approved you can market the drug. Companies such as Eli Lilly go through this procedure all the time, but we do only occasionally. Some years ago, the late Simon Katz wanted to do a study on chlorhexidine in combination with a fluoride rinse to treat radiation-caries patients. We submitted a proposal to the NIH for a four-year study. They called and asked, 'Where's your IND?' (Chlorhexidine had not yet been approved in this country.) When we said we hadn't filed one, they said, 'That's too bad, because we would have funded your project if you had filed.' "

Undeterred, Dr. Stookey asked if he had any time before the deadline. The NIH answer: one week—but it can't be done; it would take weeks to get an IND through the FDA. Summoning up the determination and energy that have helped define his reputation as a quintessential researcher whose favorite gear is overdrive, Dr. Stookey called upon his OHRI colleagues Drs. Rick Jackson, Brad Beiswanger and Simon Katz. Together, they wrote the IND application (which is the size of a hefty book) and then he flew it to Washington, D.C. to walk it through the FDA himself. "When I showed up at the NIH in Bethesda, with the

Small World Department

As an adult, George Stookey has devoted his entire professional career to the pursuit of scientific advances in the field of oral health.

As a kid, he grew up in DeKalb and Kosciusko counties, a 4-H enthusiast and the son and grandson of Hoosier farmers. His childhood was not lacking in coincidental connections to his future.

George was born in Waterloo, one of the towns in Indiana believed to have a naturally fluoridated water supply. "There's a vein of natural fluoride that runs from Angola down the east side of Fort Wayne and includes Berne, Geneva, and New Haven," he says. "Another vein runs through Lebanon, Brownsburg, and Danville. Early data indicated that people in these areas grew up with fewer cavities."

On George's first day of first grade in Waterloo, he wasn't sufficiently prepared for an upperclassman he encountered on the playground. "I got on the teeter-totter with this bigger kid—a second grader," Dr. Stookey recollects. "He banged his end of the teeter-totter on the ground, which bounced me off my end. I landed on my arm and broke it." The second grader was Charles Smith, who grew up to be director of the dental division of the Indiana State Board of Health and a colleague of Dr. Stookey's. "I left Waterloo after that year. Chuck and I didn't meet again until we were both in Bloomington getting ready to be dental students." In the years that have followed the two men have struck a perfect balance in their collaborations on a number of dental health projects sponsored by the Institute and the Board of Health.

George's first day of dental school was nearly as traumatic as his first day of elementary school. "Dr. Hine scared me to death by sending me a note saying he wanted to see me," Dr. Stookey says, referring to former dental dean Maynard K. Hine, who is now chancellor emeritus of IUPUI. "I thought: Oh, no! What have I done wrong? It turned out that all he wanted was to talk to me about my hometown, and to tell me that he, too, was born in Waterloo."

After the Stookey family moved to George's grandfather's farm west of Leesburg, George transferred from Atwood High School to Milford High, where he was the Class of 1953's salutatorian. His high school coach and history teacher was Arlo Beiswanger, father of Brad Beiswanger, who has been a close associate of Dr. Stookey's at the Oral Health Research Institute for the last 20 years.

Jean M. Richmond has devoted the past 18 years of her 29-year career at Indiana University to coordinating the Oral Health Research Institute's multi-million dollar budget.

approved document in hand, they couldn't believe it. But we made the deadline, and we got the funding."

Some of the Institute's projects have been challenging for other reasons. Anyone working at the dental school in the late '60s is not likely to forget, from an olfactory perspective, the Institute's long-term investigation of dirty diapers. "We started a program with Mead Johnson to see if fluoride could be added to vitamins without interfering with the vitamins or the fluoride metabolism," Dr. Stookey explains with a grin. "After we showed that this could be done, we began a series of studies with babies from Brownsburg in order to determine the metabolic rate of fluoride and the amount of fluoride being ingested. For their participation, the mothers were given free diapers for their babies. We, in turn, had to collect the used diapers and burn them in order to analyze the contents. Two guys spent every evening—for three years—working those diapers down."

A fluoride treatment program, initiated by the Preventive Dentistry Research Institute and targeted at Indiana's youth, is now in its 22nd year. "We developed a product to decrease the caries rate that could be self-applied by kids at school," says Dr. Stookey. "Subsequently, the program was accepted by the Army and used to treat thousands of young men during the Vietnam War. A few years later, we switched to fluoride rinses when it became clear that rinses were the better approach. The Indiana State Board of Health supported this public service program for several years, and expanded it. Eventually, it was converted into a self supporting program directed by Lynda Howard (ASDH '77, BS '80); today about two-thirds of all school systems in Indiana are involved. About 80 of the state's 92 counties conduct the caries-preventive program, which means that 75,000 to 80,000 elementary school children are participating in a typical year. More than three million children have been treated since the program began."

Dr. Stookey acknowledges the valuable support the Institute receives from dental professionals around the state. "The local division of the American Association for Dental Research is made up mostly of IU faculty," he says, "but we have had practitioners in the state who have participated, and they are always welcome. We just completed two projects sponsored by the National Cancer Institute that involved 100 practitioners in Indianapolis. For a year-long pilot study funded by the American Fund for Dental Health, dentists in Clinton County have screened elderly patients and gathered statistical information in an effort to help determine whether a national dental program for senior citizens should be started. We are currently exploring projects with two dentists who have had some good ideas. We try to help practitioners whenever we can—I only wish we had the manpower to help more. They

contribute in a big way to the research effort here."

In 1987 Dr. Stookey somehow adjusted an already packed agenda as OHRI director to accept an appointment as IUSD associate dean for research. Now overseeing the research efforts of all faculty members and graduate students within the School of Dentistry system, he recognizes the special challenge that is presented to faculty members who must try to find time for research pursuits amidst a work week that is often filled to capacity with teaching assignments. (In recent years, 85% of the dental school's research funds have been generated by the Oral Health Research Institute.)

"I saw a need to get the faculty from the many departments talking and working together," he says. "The research committee, which now meets monthly, reviews proposals and works with investigators to assist them in putting grant applications together. We try to help design the project and eliminate as much paper work as possible so that the researcher can get right into it. I think we've been helpful in that respect. A lot more faculty members are trying for grants or other funding at this point, and sooner or later that's bound to pay off. We have talented people who have the capabilities. I used to think that the best basic ideas for research came from individuals. I really believe now that they come from brainstorming in groups. The more you talk about research together, the more excited you get about it. Still, I think we need to realize that not everyone wants to do research—you can't dictate, legislate, or force it. All you can do is create a supportive environment for those who want to be involved. I think many more will be jumping on the bandwagon when some of these exciting intra-university programs get under way."

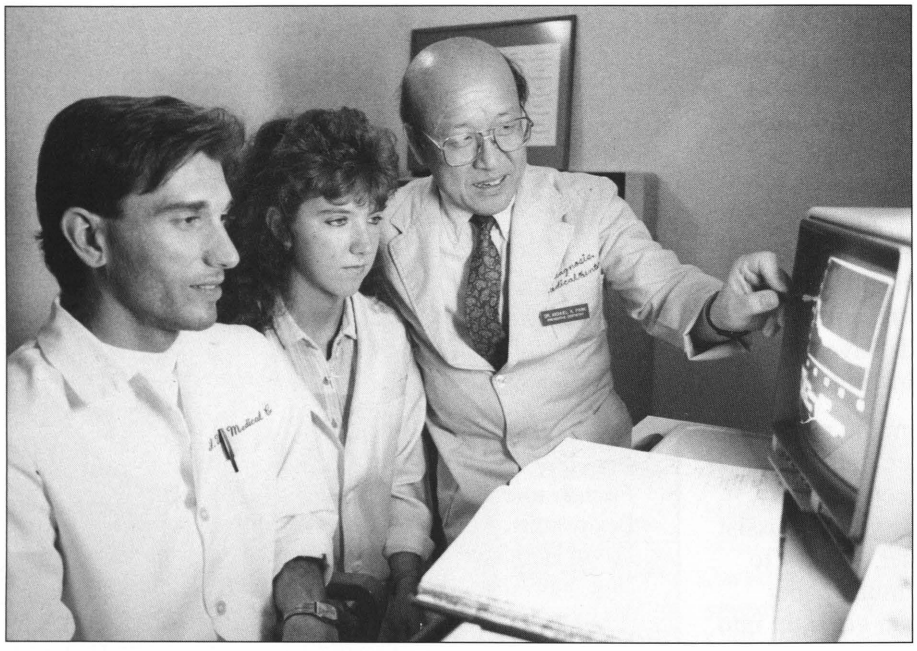
One of the programs Dr. Stookey is referring to is IUPUI's recently approved Biomaterials and Biomechanics Research Center, a $2.8 million University-funded collaborative project among the schools of dentistry, medicine, science, and engineering and technology. "It is expected that by the third year of the program it will support itself through research grants from the outside," he says. According to Dr. Stookey, the center will be the only one of its kind in the nation. "There are centers for biomaterials or for biomechanics, but this will be the first one to combine the two areas."

Success in the overall dental school research program ultimately rests with the ability to focus on specific problems. "We are asking the departments to identify specific goals and target their research to cover these areas," Dr. Stookey says. "The more the departments are able to focus their efforts, the sooner we will develop a body of expertise for given topics. When the question—'Who knows the most about *this* particular oral health problem?'—is asked nationally, we want the answer to be 'Indiana.' "

Oral Health Research Institute Full- and Part-time Employees

Budget Coordinator: Jean M. Richmond
Clerical Support Staff: Jean A. Hinman, Theresa J. Norris, and Sherry A. Smith
Dental Assistants: Cheryl L. Walker and Judith L. Weldon
Dental Hygienists: Twyla S. Beaty, Jodie L. Crawford, Sharon E. Gwinn, and Lynda S. Howard
Faculty and Professional Staff: Bradley B. Beiswanger, Michael R. Curtis, Ann J. Dunipace, David Hernandez, Richard D. Jackson, Shaoliang Jing, Sue A. Kelly, Leonard G. Koerber, Yiming Li, Melissa S. Mau, Kichuel K. Park, Bruce R. Schemehorn, George K. Stookey, Marita A. Tuohy, Janice M. Warrick, and Gerald D. Wood
Hourly Support Staff: Mary Ann Bartl, Michael C. Beaty, Gregory A. Bierman, Susan L. Boggs, Ronrita S. Brown, Marcia L. Connell, Karston E. Duerden, Shing-Zeng Dung, Kimberly L. Eskridge, Noel G. Garcia, Birtie Alice Hammack, Maurice I. Healey, Jay Todd Hunt, Tracy G. Kershaw, Cherisse D. Moore, Laura D. Nelson, Thomas E. Quill II, Marilyn J. Richards, Nicole G. Thayer, Beth A. Warrick, and Nancy A. Young
Technical Support Staff (animal care, data collection, technicians and technologists): Terry L. Ball, Brian J. Beesley, Andrew J. Beiswanger, Jeffrey W. Bolton, Tonia R. Booker, Kathleen R. Cooper, Richard E. Farnham, Glynis M. Henry, Blake J. Keillor, Ralph J. McClure, Linda L. Miller, Timothy W. Noblitt, Veronica M. Pierson, Jehangir T. Rizvi, Kenneth R. Stookey, and Wu Zhang

Also of critical importance to the timely completion of numerous research studies conducted annually are the Institute's temporary faculty and staff members who are on call to assist as needed. At last count, this group was 95 strong!



Dr. Kichuel K. Park (DDS '62, Seoul National University) discusses his plaque pH model with OHRI senior research technician Jeffrey W. Bolton (BS '85, Indiana State University) and Michele A. Trelo, a Purdue University Calumet student studying with Dr. Park as a participant of a special summer research program funded by the National Institutes of Health.

Despite the growing number of administrative duties falling to Dr. Stookey, he is still a researcher at heart. There are mornings when he would like nothing better than to slip on a white lab coat and claim a spot behind one of the microscopes. "There have been periods when I have done just that, for a day or a week," he says wistfully. "But if you don't do it regularly, you soon become obsolete. At this point, there are some instruments we have that I don't know how to operate, even though I understand their function. It's been a learning experience for me to accept the fact that other people can do some of these things better than I."

Although he no longer personally collects data on a day-to-day basis, Dr. Stookey has retained as much of a hands-on approach as possible to the multitude of studies going on at the Institute. He evaluates every proposal that goes out the door, and meets frequently with investigators to stay abreast of their progress. He is principal investigator for a current root caries study funded by the NIH, as well as for all of the contract studies involving fluoride and tartar-control products for animals. He is also working on an IND application with a long-range plan of creating a mouth rinse or toothpaste containing microcapsules that are able to release antimicrobial agents gradually throughout the day.

In the area of acquisitions, Dr. Stookey goes perpetually to bat for his colleagues, many of whom require sophisticated and costly instruments to advance their work. He is currently in the process of securing government or University funding to obtain a $225,000 confocal microscope for the school, and one can feel his excitement. "Depending upon the nature of the material being looked at, this scope can analyze a sample to a depth of 100 microns—that's a tenth of a millionth of a millimeter—without destroying it." The scope will be especially valuable in such areas as implant studies.

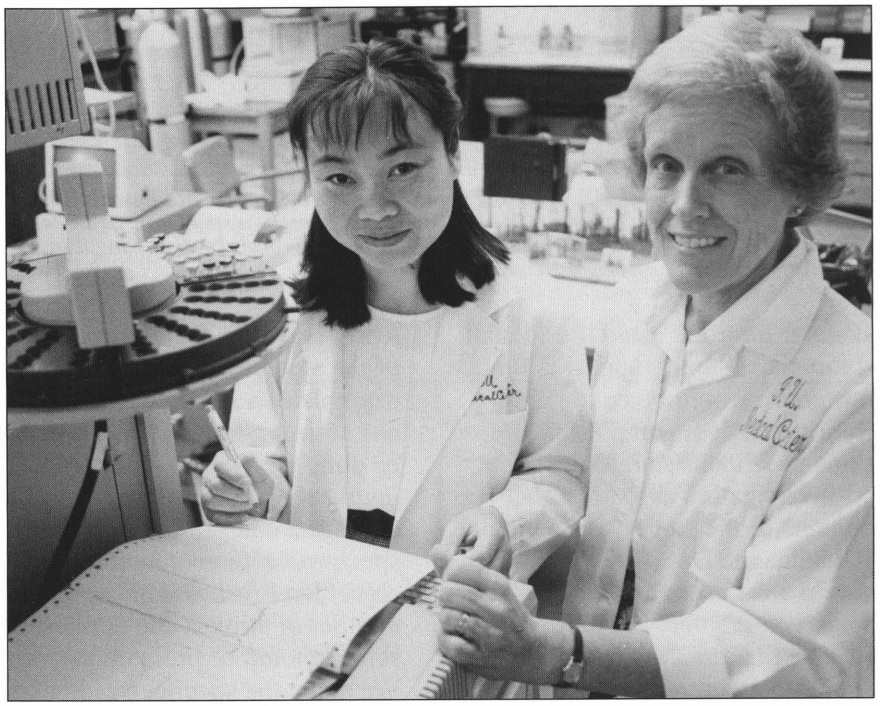
After three years in his dual roles as OHRI director and IUSD research dean, Dr. Stookey has all but worn a permanent path through the parking lot between the two buildings during his countless treks back and forth in a day's time. As a relatively new research dean, he is pleased with the direction the school's research program is taking. And, as a man who has been briskly stepping along on the OHRI research trail since its beginning, he reflects an extreme pride in being associated with the people who have shared all or a portion of that journey with him.

"There really is a unique attitude at the Oral Health Research Institute," he says. "Deadlines can be ferocious, and since we are not funded by the state, everybody who works here knows that our future as an organization depends upon our ability not only to meet deadlines, but to do quality work—to come up with good ideas, and find good approaches to those ideas. The people at the Oral Health Research Institute work hard, and, most important, they work together."

Ann J. Dunipace, PhD
Associate Director
Preclinical Research

If it doesn't work in the lab, chances are it's not going to work in the clinic, either.

With clinical research studies an extensive and expensive proposition, one function of Ann J. Dunipace's preclinical research team is to ensure that they also are not a waste of time. "Much laboratory work goes into a test product before it ever gets to the clinical testing stage," says Dr. Dunipace. "For a hypothetical example, if a company wanted to develop a new fluoride toothpaste, researchers would first take the test product to a laboratory to compare it to an effective fluoride-containing toothpaste such as Crest and a placebo containing no fluoride. If the test product behaves as well or better than the existing product in terms of the fluoride that is taken up by the enamel, that's encouraging. If the product is no more effective than the placebo, then the results indicate to the company that there is no sense in putting the product into clinical trial. Also, products cannot be placed into clinical trials until they have been safety tested in the lab for use by humans."

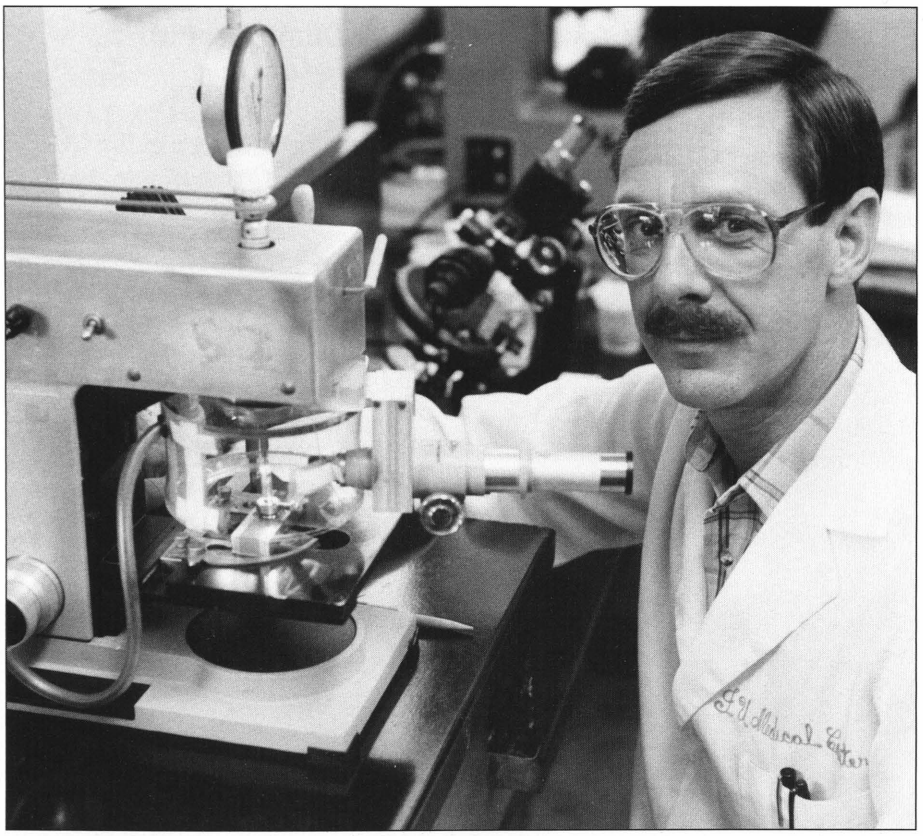


Dr. Dunipace (right) and research technologist Wu Zhang (BGS '89, IU) examine a gas chromatograph used in the Institute's cotinine assay for a smoking cessation study currently under way.

The Institute's preclinical division comprises an assortment of laboratories that are equipped to handle a broad range of in vitro assays. A stroll through the building on any given day reveals an abundant amount of activity—beakers boil, plates stir, machines brush, and computers leave a trail of printout sheets. Once again, Dr. Dunipace finds herself happily pursuing a body of research that is not directly related to her educational background.

A graduate of Vassar (bachelor's in physiology) and Harvard (PhD in pharmacology), Dr. Dunipace did not originally plan to mold a career in dentistry—one in which her contributions to the advancement of science would include the routine donation of her own saliva. "Many of us at the Institute used to donate our saliva for use in laboratory testing," she acknowledges with a smile. "Now, we are paid for it!" Dr. Dunipace is accustomed to working in areas other than pharmacology. When her husband, Kenneth, was on the engineering faculty at the University of Missouri in Rolla, Ann worked briefly in the metallurgy department there. "I elected to stay home with our two children during the early years," she says. The family moved to Indianapolis in 1977 when Kenneth accepted a position as a professor of electrical engineering on the IUPUI campus. Ann was hired in the medical school's biochemistry department, where she remained until Dr. Stookey offered her a position in 1985. "Dr. Stookey was looking for someone primarily to help with grant preparation. When he reorganized the Institute three years ago because of demands on his time as the dental school's new associate dean for research, he asked me to head the preclinical area."

The preclinical division is a major site for contract testing as



Research associate Gerald D. Wood has contributed to the Oral Health Research Institute team for 23 years. Here he uses a fluoride microdrill to make a small hole in an enamel chip. Afterward he will examine the enamel powder for fluoride by dissolving it in perchloric acid and applying a citrate EDTA buffer.

well as basic research activity funded by grants. The group continues to be deeply involved with projects pertaining to the use and effects of fluoride. "How much fluoride is O.K.? How much is too much? There has been a resurgence of these questions, and they never go away completely," says Dr. Dunipace. "Questions are now arising about fluoride intake because people are using many dental care products containing fluoride in addition to using fluoridated water. We must continue to look closely at fluoride-related issues."

Preclinical researchers are hoping to contribute to a proposed program project (one major study involving multiple grants) that will involve a collaborative effort with researchers in other parts of the world. "We want to look at the effects of fluoride in individuals who, because of medical conditions or malnutrition, may be at increased risk," Dr. Dunipace explains. "Some regions in the world contain high levels of natural fluoride in the water, and many of the people living in these territories do not have good, complete nutritional diets. In the areas we are interested in, people burn coal in their homes so they are inhaling a lot of fluoride as well. We want to know what this unusually high exposure to fluoride does to people who lack a healthful diet. This issue was brought to light by the fact that in areas of India with similar conditions of high fluoride content in the water and poor nutrition, there are cases of crippling skeletal fluorosis as well as dental fluorosis. If this proposal is funded, our group would be conducting fluoride analyses on plasma and urine specimens sent to us by our co-investigators abroad. Other components of the study would involve IU colleague Dr. Yiming Li, who would work from a cell culture perspective. It's very exciting, and we believe that the data would be very useful to all countries."

In addition to routinely submitting protocols for research related to grants, the preclinical group generates a substantial amount of research through sponsored agreements with industry. The Institute's strong reputation as a reliable source for contract testing keeps the group hopping, and the director of this team, Bruce Schemehorn, busy coordinating activities with sponsors throughout the United States and Europe. "We have excellent models to test products for abrasion or for their ability to clean teeth," says Dr. Dunipace. Not all of the studies are lengthy. "A good example of a short contract study is our abrasion assay, which can often be done within a few days. It involves making a slurry out of the dentifrice and brushing an enamel specimen with an automatic machine that brushes with an exact number of strokes and applies the same amount of pressure each time. We make the specimen radioactive with radiophosphorus. The more abrasive the dentifrice, the more surface of the enamel is going to come off into the slurry. A portion of the slurry is then counted in a scintillation counter. We calculate the product's degree of abrasiveness by finding out how much radioactivity is present."

The typical test model for remineralization and demineralization takes about a month. "For these studies, we create incipient lesions in 3 mm enamel disks that have been cut from extracted,

human teeth and mounted on Plexiglas rods, which are suspended into treatment beakers. After being exposed to acidic conditions which simulate the demineralization that takes place in the mouth, the samples are placed in a test product solution—a mouthrinse or dentifrice slurry—and then saliva for the remineralization stage. After eight days of this cyclic treatment, we examine the lesioned area for changes in fluoride content and enamel hardness which result from treatment with the product."

The preclinical researchers are currently analyzing saliva samples for cotinine, a by-product of nicotine, for a smoking cessation study. "Cotinine is analyzed by gas chromatography," says Dr. Dunipace. "Our results are used to document whether or not an individual has stopped smoking. The pace has finally calmed down, but for a while we had hundreds of specimens coming in every week."

Overlapping into the preclinical division are the denture chip model and Dr. Kichuel Park's plaque pH model. Although each involves human subjects, both are designed as a laboratory model. Members of the denture chip panel, which includes about 80 partial denture wearers, help researchers do product comparisons by carrying lesioned enamel specimens within a metal portion of their denture. "They are a unique group," says Dr. Dunipace. "Some of these people have been panel participants for five or six years. We assign 30 or 40 individuals to a typical study. If a company wishes to compare four products, for example, every panelist will use each product (while wearing different enamel chips for each two-week treatment period) in a randomized order. We then analyze the chips for fluoride uptake and for remineralization to compare the effectiveness of the products."

Landmark results produced two years ago with Dr. Park's plaque pH model revealed that chewing gum after eating a cariogenic substance can prevent plaque pH from falling to a point at which enamel begins to demineralize. His panel group includes several individuals; their dentures have been adapted to accommodate a pH electrode, which is connected to a computer in a special two-chair clinic where the subjects are seen. "These are long-term studies," says Dr. Dunipace. "The subjects come in to see us after they have accumulated plaque on their partials by refraining from brushing their teeth. After Dr. Park records their baseline plaque pH, the subjects eat a snack or a meal that promotes acidity and then use the test product—a gum or lozenge in many cases—to see if the product keeps the pH from dropping to its critical point. In addition to testing company products, Dr. Park has used the panel to compare foodstuffs for their cariogenicity. "He found that corn chips and other items that don't clear rapidly from the mouth may cause a fall in pH that stays down longer than it does when a food such as a chocolate bar is consumed. It is a wonderful model that produces computerized composite printouts showing how the plaque pH behaves. The model can be adapted to fit the needs of individual companies."

Dr. Dunipace finds her association with the Institute rewarding. "We are a small group, and there is camaraderie among the employees—both faculty and staff," she says. "I'll be the first one to tell you that I can't do many of the laboratory procedures that some of our longtime technicians perform. I haven't had their experience, so I ask them questions; the technicians in turn come to the faculty with questions when they have an idea they want to try. Right now two young members of the group, Ralph McClure (BS '88, Marian College) and Brian Beesley (BA '88, Wabash College), are working at developing a technique for analyzing cotinine in urine. They have initiated this idea on their own, reading up on the subject and thinking things through for themselves. All of the staff works hard and—to meet deadlines—frequently under stress. They are fine, reliable employees."

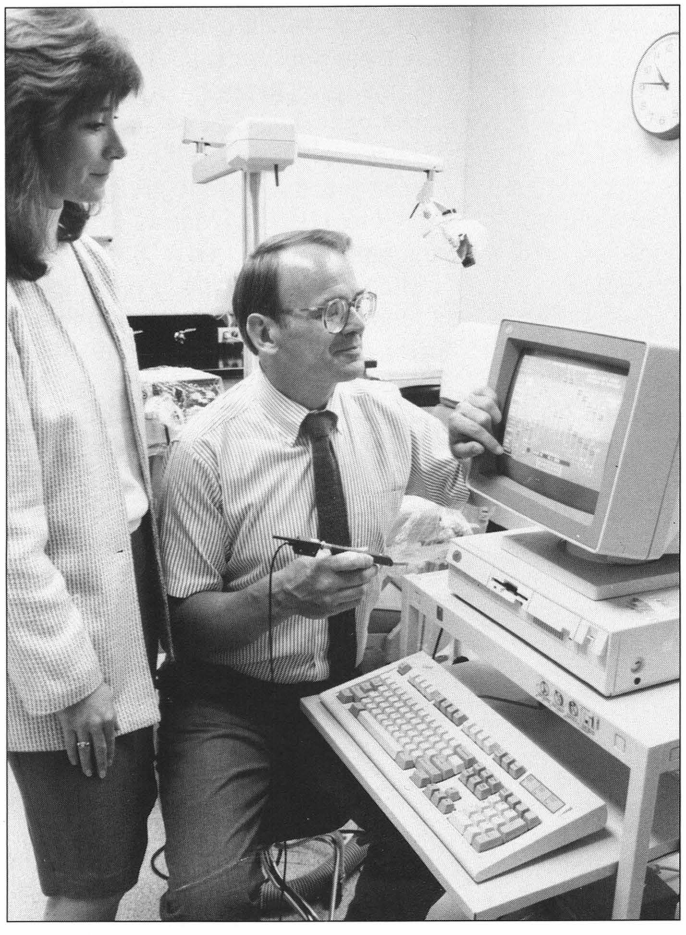
Bradley B. Beiswanger, DDS
Associate Director
Clinical Research

When Brad Beiswanger set his sights upon a career in biologic research, he envisioned himself embarking upon an academic trail familiar to most college students with similar goals—a PhD program in biology, perhaps, or in zoology. The doctoral program in dentistry, without a doubt, was furthest from Brad's mind—until, like George Stookey before him, he went hunting for a part-time job on the Bloomington campus and wound up working for Dr. Joe Muhler.

"Dr. Muhler had moved to Indianapolis by that time, but he still had a couple of small labs running in Swain Hall," Dr. Beiswanger remembers. When Dr. Muhler learned that Brad was intending to go to graduate school, he urged him to pursue a DDS degree instead of a PhD. "I told him that I wanted to be a researcher, not a dentist, but he replied: 'You can do research in dentistry. That's what *I* do.' He told me I could put myself through the program by working in the preventive dentistry department." Brad followed up on the suggestion, as well as the offer of a job—and he also stuck faithfully to his original plans. Now 23 years into his career, Dr. Beiswanger is highly regarded nationally and elsewhere as a dental researcher whose clinical team has contributed to a number of significant studies pertaining to everything from fluoride to smoking cessation.

"Rather than being identified with a certain area of expertise, I'd like to think that the Institute's clinical group is known for its ability to conduct good clinical research studies," Dr. Beiswanger says. "It doesn't really matter what adjectives you put in front of the word 'research'—plaque, fluoride, gingivitis, smoking cessation, pharmacology, toxicology—we've done studies in all those areas and I think we have done them equally well. Take the topic of smoking cessation, for example. I don't know anything about it personally—that's Arden Christen's area—but I *do* know how to design a good study for it and interpret the results." The group has in fact completed four projects on smoking cessation, including a landmark study five years ago that was headed by Dr. Christen and used by the FDA to approve Nicorette, a nicotine-containing prescription chewing gum for people trying to quit the smoking habit.

The Institute's routine in the '90s is dramatically different from a typical day in the '70s, when researchers more often than not



Dr. Beiswanger and Melissa S. Mau, assistant director of clinical research, look at the Institute's newly acquired Florida automated periodontal probing system. The system consists of a pressure-sensitive probe which records pocket depth and attachment loss data directly into a computer data-base.

worked at off-site locations in school systems throughout Indiana. "In those days we primarily studied different fluoride treatments to see if we could affect dental caries in children," Dr. Beiswanger says. These studies formed a well-known chapter in the state's dental history—they were so successful at affecting caries that by the mid-80s, it was no longer possible to find enough children in Indiana to participate. "For our last study of this kind, we had 6,600 kids, and in that group we couldn't find enough caries to do a significant study. There are still children out there with cavities, of course, but fewer than there used to be, and the average child has fewer cavities—half the children up to age 17 in Indiana now have no caries at all."

During the past decade, the Institute's clinical group has been involved with a number of pivotal studies. The original stannous fluoride formula used in Crest gave way in the early 1980s to a new advanced formula after studies at the Institute concluded that sodium fluoride was the more effective agent. "While most researchers around the country debated which was more effective—stannous fluoride or sodium monofluorophosphate (MFP)—some felt that sodium fluoride might be better than either one," Dr. Beiswanger recalls. "Historically, sodium fluoride had gotten a bad rap because of technical problems associated with it. Once those technical problems were solved, however, sodium fluoride looked pretty good." The IU results were confirmed by researchers at Ohio State.

In 1985, Dr. Beiswanger's team conducted one of the first two studies on products that reduce dental calculus formation. "We worked on that one for over 20 years," he says. "At first we found agents that reduced calculus really well, but had many side effects. Finally, we came up with a formula that reduced dental calculus but was innocuous in other ways." The product became Crest Tartar Control toothpaste, containing soluble pyrophosphates.

Today, the clinical group is active on many fronts. Having successfully created a second-generation anticaries toothpaste, the research clinicians are now in the process of creating a second-generation anti-tartar toothpaste that will contain antimicrobial agents as well. In a study evaluating the safety of a new mouth rinse, paid participants (mostly employees from the Institute and the dental school) are helping by rinsing with the product every hour on the hour (during the work day) for five days at a stretch. In two projects involving an already marketed antimicrobial mouth rinse, the researchers are trying to determine 1) if an additional ingredient will inhibit tooth staining without interfering with the antimicrobial effects, and 2) if periodontal therapy can be improved by having patients use this product (known for its ability to reduce gingival bleeding) beforehand.

For each clinical study the Institute initiates (and it's not unusual for several to be running at one time), the call goes out to anywhere from a few hundred to a few thousand "volunteer" patients. What might be a research coordinator's nightmare in some institutions is a finely tuned and well controlled system here, due in part to a computerized patient pool of more than 4,000 persons.

"Our computer contains names and information on all of the people who have come to the Institute to participate in studies in the past," Dr. Beiswanger explains. Names can be retrieved according to variables pertinent to specific studies. "If we were to design a study that required, say, 800 males, 25 to 30 years old, with moderate levels of gingivitis and at least 20 teeth, we'd find out who they are by looking in the computer. The data

Dental assistant Cheryl L. Walker uses a computer program to track more than 4,000 individuals who are part of the Institute's clinical patient pool.

base is extremely important to us because it often saves us from having to go to the expense of screening patients for a study. If a potential sponsor wants us to do a study on calculus, for example, we already know that only about two thirds of the population form calculus. To come up with 500 participants, we'd first have to screen maybe a thousand people. With our volunteers computerized, I don't have to screen them—I already know who among our subjects forms calculus and who doesn't. The computer saves money for sponsors and also makes conducting a study more efficient for us."

When major screening projects *are* required, Dr. Beiswanger draws upon a large pool of temporary employees to keep studies on schedule. "Today we started a new study on an anticalculus dentifrice. A half dozen dental hygienists have been brought in to do prophys on 400 people who form calculus," he says. "These are tough prophys to perform; they take at least an hour each. If we used only the Institute's two full-time hygienists, it would take an unacceptably long time to complete the study."

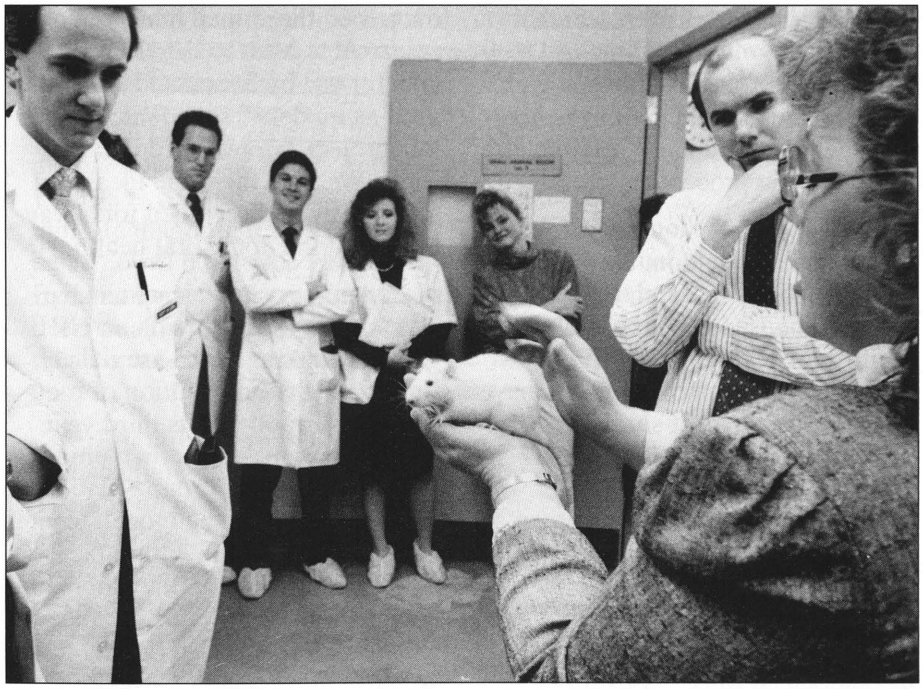
One sizable hurdle to overcome in clinical research, as Dr. Beiswanger sees it, is the fact that a certain amount of subjectivity plays an inevitable (and unwelcome) role in every investigator's work. "I may judge a patient's gums to be 'moderately' inflamed, when another scorer may see the same patient's gums a little differently," he says. "Also, if I look at a patient today, I might say that his gums are moderately inflamed. If he comes back three weeks later, his gums may be exactly the same, but this time *I'm* in a different frame of mind, and I'll say the gums are 'mildly' inflamed. It's subjective. One of our biggest challenges is to develop more objective, more quantitative methods. With such new methods we would reduce error and we could increase the accuracy and precision of our research." As it is now, the Institute's patient panels remain ample to account for human fallibility.

"If you're a happy clinical researcher, you probably aren't doing a good job," Dr. Beiswanger says with a smile, only half joking. "The pitfall is being able to concentrate long enough to fight your way through a study. Concentrating on gums from 8 to 5 every day for weeks is hard work! You can do it for a while, but then you have to keep at it, remaining as consistent in your judgments as you can. It's a constant struggle. I think there is a certain amount of misery that comes with the territory or you aren't trying hard enough."

While Dr. Beiswanger pursues a number of teaching responsibilities (he offers a course in statistics to postdoctoral students and helps several students each year design analytical methods for their thesis projects), he relies upon Dr. Richard Jackson for a major portion of the grant writing that must get done, and upon assistant director Melissa Mau to prepare protocols for sponsors, negotiate budgets and see to other sponsor-related business.

"The most impressive thing to me about our organization, and the reason I enjoy working here so much, is that we are a full-time professional clinical research team," says Dr. Beiswanger. "There are not many such teams around. There is a big difference in the quality and usefulness of research performed by dedicated groups such as this as opposed to research performed by part-time amateurs and dabblers. Clinical dental research is our only reason to exist."

As a longtime member of an organization that has earned its keep (and a top-rated reputation) by developing and testing products for private industry, Dr. Beiswanger values and respects the relationship between the industrial and university environments, but concedes that it comes under a fair amount of criticism. "Critics say that it's easy for academic researchers and industry to get too cozy, and for researchers to try to get the results that are being sought by the company—but that's simply not true," he says emphatically. "Reputable companies know that they have to hear the truth, favorable or unfavorable to them. Dozens and dozens of our studies over the years have not come out as hoped by the companies paying for them, but they keep coming back to work with us again and again. We've worked with very large and very small companies, and with some companies' competitors. Likewise, companies that work with us also are involved with projects at many other universities. I don't think the critics understand this. The fact is, universities don't have the money to conduct research, and industry doesn't have the time or expertise. I see the research relationship as greatly beneficial to both groups."



Ms. Warrick (right) guides a tour group through one of the animal rooms during a special program held last spring to better acquaint IUSD faculty, students and staff with the goals and methods of research involving animals.

Janice M. Warrick
Assistant Director
Animal Research Facility

Roast today. Shiver tomorrow.

Almost everyone who works or attends classes at the IU dental school has at one time or another fallen victim to the building's capricious air conditioning and heating system.

For most of us, such fluctuations in temperature are, at their worst, uncomfortable and terribly annoying. For Janice Warrick and her team of technicians in the Animal Research Facility, however, erratic temperatures can spell disaster. They must be avoided at all cost.

"Varying temperatures can jeopardize the integrity of a research study, as well as the welfare of the animals," says Janice from her office in a fifth-floor facility that is rarely seen by most of the people at the school. "Our air-handling system is separate from the one that takes care of the rest of the school. When the temperature falls outside a certain acceptable range, an alarm goes off and we send for the guys from the physical plant. They understand that our situation is critical."

Temperature is but one of many aspects of the research animals' environment that concern Janice daily. The research facility is a place where regulations and policy govern every minute detail, from how often food cups must be sanitized (every week) to how many times in one hour a 100% fresh air change-over in the animal rooms must occur (at least 10) to how large a rodent can grow before it no longer is permitted to share a cage with another rodent (300 grams). Rodents are separated by species, and species are separated by supplier. The Animal Facility adheres to strict guidelines issued from a variety of sources including Indiana University's Research and Sponsored Programs, the National Institutes of Health, and the U.S. Department of Agriculture. When grants are awarded from outside agencies such as the National Aeronautics and Space Administration (NASA), those sponsors usually have their own set of regulations that must be met as well.

But don't expect to hear any complaints from Janice. "It is our responsibility to make sure that research animals are cared for in the most humane way possible," she says, reflecting pride in a well organized system she has been contributing to since joining the staff 10 years ago.

The unit has been fully accredited by AAALAC—the American Association for Accreditation of Laboratory Animal Care—since 1967 (accreditation is reviewed every three years). What is perhaps most impressive about the 5,400 square-foot facility is the team that keeps it running. Compared to many animal facilities in which employees are hired primarily as caretakers, this unit employs highly trained professionals who are capable of monitoring a research project from its rudimentary stages to completion. "We conduct all of the animal studies that go through the Institute," says Janice, who in 1987 earned the highest level of certification from the American Association for Laboratory Animal Science (AALAS). "We do all of our own treatments, including administration of experimental agents and blood or tissue sampling. We write the protocols, analyze the data, and prepare the final reports." Technicians who do not already hold certification status with AALAS are working toward it. Such efforts have not gone unnoticed—last year, certified assistant laboratory technician Blake J. Keillor, who has been with the department for seven years, was named Technician of the Year by the Indiana Branch of AALAS and also by AALAS District 5, which encompasses university and commercial animal facilities in Michigan, Indiana, Kentucky and Ohio.

In addition to running the Institute's studies, the group assists the dental school's faculty and graduate students with their projects. Under the newest set of guidelines issued by Indiana University, researchers requesting use of animals in their studies face an exhaustive review at the protocol stage before they are permitted to proceed. The school's Animal Care Committee, headed by Dr. George P. Willis, has some pointed questions to ask: Is the project an unnecessary duplication of someone else's work? Is there an in vitro model that could be used instead? Is the species being considered for the project the lowest that can be used? Are the procedures humane? Are too many animals being requested? Too few?

"A scientific investigation using an excessive number of animals is just as harmful as an investigation that doesn't use enough animals to give statistical differences," Janice says. "Either way, you have wasted an animal's life. These issues are of major concern in research circles, and they must be addressed." Protocols must also pass muster with a statistician before a project receives the go-ahead. For every study undertaken, training tapes must be reviewed not only by novice researchers such as the typical graduate student, but also by the principal investigators. "Even someone such as full-time faculty member Dr. Abdel Kafrawy, who is a member of our Animal Care Committee (*and a member of the school's research faculty since 1972—eds.*). As a committee member he reviews all research protocols involving the use of animals; but for the studies in which he is named as principal investigator, he is required like everyone else to review the procedures presented on these tapes."

Primates, seldom used in the dental school's research today, have not been housed in the animal facility for several years. (Pigs, with the exception of primates, have molars that are most similar in structure to the human's. And, oddly enough, the frog's oral mucosa is enough like the human's to be of possible use in research.) Most of the Institute's research involving animals is conducted with Sprague-Dawley rats, Syrian hamsters, and mice. A colony of 27 nine-year-old Beagles purchased by the Institute seven years ago has been of immeasurable value in Indiana's numerous studies of calculus and plaque, including one that has yielded a new product of benefit to *them*.

A tartar control milk bone for dogs that recently hit the national market is the result of a five-year, commercially-funded study conducted by the animal lab. "When researchers want to develop products for use by humans, dogs are used as models," says Janice. "For this project, we reversed the concept! We took the same ideas and technology and searched for a way to benefit the dogs' oral health."

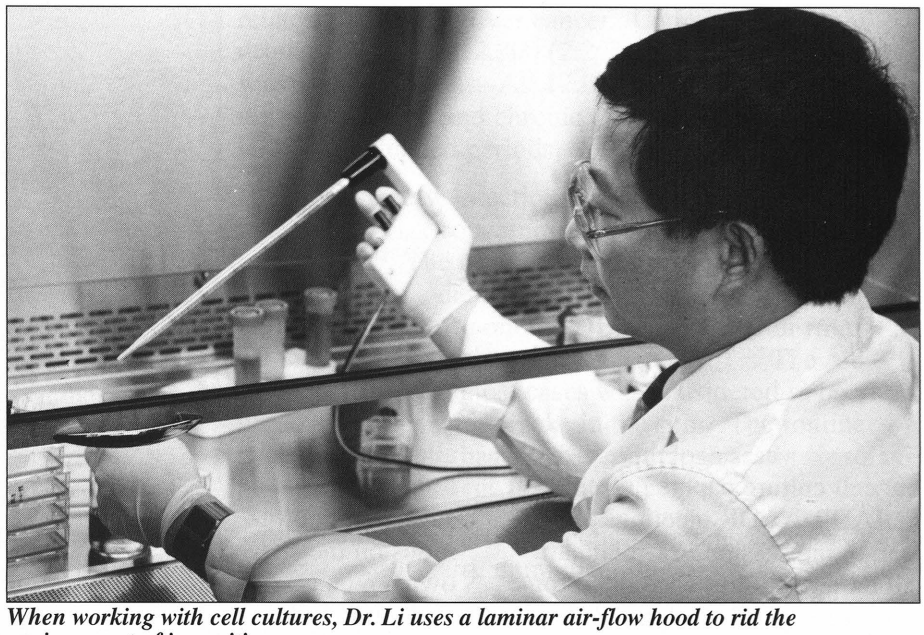
Another study, an extensive investigation funded with an NIH grant, is looking at the use of fluoride for the prevention of root caries. Currently in its third year, the program makes its own unique demands upon the group. "We are using hamsters as the model, testing not only for fluoride within the tooth, but also within the blood and major bones of the body," Janice explains. "The hamster's tiny teeth are difficult to handle—we are comparing fluoride in the root tips of molars to the fluoride in the alveolar bone and other bones. We must, of course, do all of these steps blind, so every sample has to be coded—and somebody has to double-check every coded sample! There are as many as 18 samples for each hamster, and a total of 200 animals. It gets to be quite a challenge, especially for our quality assurance officer."

While animal caretaker Tonia R. Booker keeps a watchful eye on the clock, she and certified laboratory animal technician Linda L. Miller time their application of experimental anticalculus dentifrices to Sprague-Dawley rats. Quality assurance officer Jehangir T. Rizvi monitors the accuracy of test procedures.

With numerous animal studies running simultaneously for faculty, postdoctoral students and contract sponsors, housing within the facility is routinely at a premium. In early summer the facility's animal accommodations were already booked well into the fall. "For caries or calculus studies, it's not uncommon for one project to require 300 rats," says Janice. "At the moment, we have seven experiments going on that involve rabbits, hamsters, rats and dogs."

Overseeing facility activities on a weekly basis is Dr. A. Pat Riggins, Jr., University veterinarian and director of Laboratory Animal Resources, IU-Bloomington. "Dr. Riggins tours all of the animal rooms each Wednesday, checking the animals, their cages—everything right down to the food cups," says Janice. "Facility supervisor Kathy Cooper prepares a list of 'patients' for him to see—we are always on the lookout for animals with excess hair loss, a nodule, an eye problem, and the like. He gives us the 'white glove' test on shelves and counters. He checks to see that food and drugs are in date. Dr. Riggins is thorough." He also trains all new employees.

While some might falter under this never-ending burden of striving for perfection in a work place where there is no such thing as a trivial detail, Janice Warrick clearly flourishes. She is proud of the facility's outstanding reputation, and of the part she plays in the University's research effort. "Because our contract studies are done with a multitude of companies, we have maintained our position as an independent research body," she says. "Our group can do a caries study in rodents in three weeks that predicts results that would take three years to collect if human subjects were used—this is but one example of the many ways our facility's contributions are important."



When working with cell cultures, Dr. Li uses a laminar air-flow hood to rid the environment of impurities.

Yiming Li, PhD
Director
Cell Culture Laboratory

If all goes according to plan, many of the research procedures that once required the use of animals may be routinely performed in a plastic laboratory apparatus no larger than the palm of a hand.

Dr. Yiming Li and his cell culture team, like other dental scientists throughout the country, are looking increasingly to cell biology as a new way to find answers to some of dentistry's oldest questions.

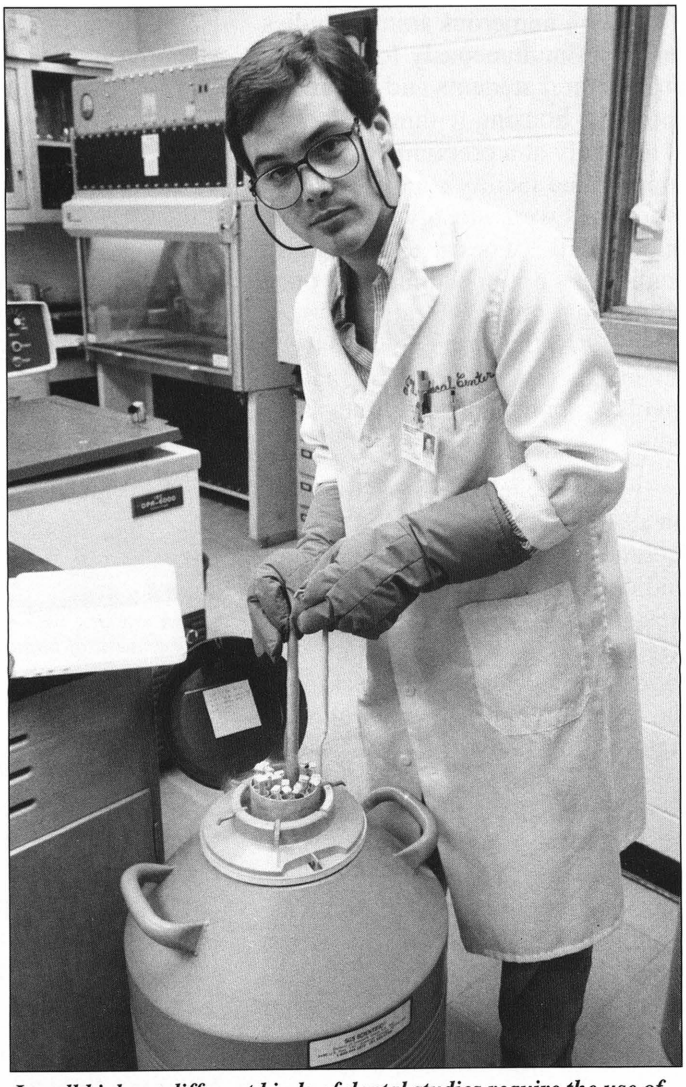
The young dentist and former faculty member from the People's Republic of China cites an example: "Although there are many theories, very little is known why some patients develop pulp irritation to a dental material after having a restoration placed. Scientists have long debated the reasons for pulp irritation—chemical and physical effects of restorative materials, microleakage from microgaps, and so on. More and more, researchers are focusing on bacteria as the root of the problem. In the past, the majority of pulp studies have involved use of primates. With a one-year NIH grant, we are creating an in vitro cell culture model that simulates the clinical situation. We hope to be able to study this problem—and other problems related to dentistry—in a manner that greatly reduces the number of animals and human subjects needed. There are many other advantages to cell biology studies, which are conducted in a well-defined environment with highly controlled variables. They are fast, cheap, reliable, and repeatable." Based on preliminary data from the pulp study, the team has submitted a four-year proposal to the NIH which, if granted, will allow the pilot program to be further developed into a model for practical use.

The pulp study is just one of many cell biology projects currently under way in the Oral Health Research Institute's newest research division, and many others are on the horizon. "Famous biologist E.B. Wilson predicted in 1925 that the final solution to every question in biology would be found in the cell," says Dr. Li. "A human being is made up of more than 100 trillion cells, and each is a living unit. Almost every field of science now uses cell culture techniques—dentistry has been a bit slow in establishing cell biology laboratories, but that is beginning to change.

Five or six years ago, there were few cell culture papers presented at the IADR/AADR meetings. This year, at the session in Cincinnati, cell culture studies accounted for about 13% of all work presented."

The Institute began to turn its attention to cell culture research a few years ago while Dr. Li was preparing his doctoral dissertation on the genotoxicity of fluoride. With no such facility available to him within the dental school at that time, he conducted a portion of his study in the School of Medicine's medical genetics department. "As head of my research committee, Dr. Stookey saw the need for creating a cell culture laboratory that would serve the dental school's faculty and students," says Dr. Li. "I had had some experience in cell culture work back in China, so Dr. Stookey began to talk to me about the possibility of creating a facility here."

Although new to the faculty, Dr. Li has been a familiar face among IU researchers since he arrived in Indianapolis from Shanghai to study dental materials with Dr. Ralph W. Phillips in 1982. As IUSD's first student from the People's Republic, Dr. Li was also the first member of the dental faculty at Shanghai Second Medical University to be sent overseas to study. "Between 1982 and 1984, the government selected candidates by having us compete in a national examination," he says. "Eventually, they opened the door further, allowing people to look for educational opportunities on their own. When I first came here, there were only a couple of hundred Chinese students in the United States. Today, there are more than 40,000."



In cell biology, different kinds of dental studies require the use of different kinds of cells. When not in use they are stored by type in test tubes and frozen in a tank of liquid nitrogen, as shown by senior research technician Timothy W. Noblitt (BS '87, Indiana State University).

Dr. Li's opportunity to study abroad did not come without sacrifice. He was not permitted to bring his wife, Wu Zhang, who gave birth to their son a month after Yiming left. Wu was able to join Yiming—without the child—in 1985; two more years would pass before the family would finally be able to live together in Indianapolis. Wu now works as a research technologist at the Institute.

After Dr. Li completed an MSD degree in dental materials in 1984 and a PhD in dental science (preventive dentistry) in 1987, he spent two years as an IU postdoctoral fellow before being appointed to the faculty to direct activities in the new Cell Culture Laboratory. After the dental school's former television studio is renovated, the cell culture group, which includes full-time research technicians Timothy W. Noblitt and Kenneth R. Stookey, will move from basement quarters to the fourth floor.

The lab will function as the biocompatibility core facility for IUPUI's recently funded Biomaterials and Biomechanics Research Center, a collaborative research effort involving four schools on campus. "Among other responsibilities, we will be conducting tests for safety on all new materials developed by the schools of dentistry, medicine, engineering and technology, and science," Dr. Li says. Other joint efforts are beginning to get off the ground as well.

The American Dental Association's chief toxiologist, Dr. Chet Siew, who recently toured the facility, has shown an interest in collaborating with Dr. Li's group, and the cell culture group has been invited to participate in an international program concerning biocompatibility research of dental materials initiated by scientists in Japan and involving Japanese, American, French and Italian scholars.

To create an artificial environment in which cells may thrive during experimentation, the laboratory is equipped with instruments that promote an aseptic, well-controlled work place. Cell populations are grown in two large incubators with temperature and atmospheric controls. All procedures performed on the cells are done under a laminar air-flow hood, which propels a continuous vertical flow of contaminant-free air. A purification system provides virtually pyrogen-free water. When cells are not in use, they are preserved indefinitely by being submerged and frozen in a tank of liquid nitrogen. "Some cells have limits as to how many times they can be cultured," says Dr. Li. "They begin to lose their characteristics and die out. But we do keep a stock of cells; when we need some, they are thawed and placed in a culture medium, where they grow again."

What cells the researchers don't grow on their own, they buy—and every imaginable kind is available commercially. Dr. Li's group is currently working with such diverse types as mouse fibroblasts (which, unlike human fibroblasts, sustain a continuous cell line over long periods), ovary cells from the Chinese hamster, human and animal bone cells, human gingival and periodontal ligament cells, and tumor cells. "For each culture, we use perhaps one million cells," says Dr. Li. "We typically buy two milliliters, then culture divide them to establish a stock. We usually plate one million cells in one flask to begin the duplicating process. The cells we are using now are on duplicating cycles ranging from 17 to 30 hours. Often in cell biology we can complete an entire study in one or two weeks—that's very quick compared to projects that involve animals."

Another area under investigation at the cellular level is fluoride toxicity. "Originally, researchers believed that fluoride enters the cell freely, with no cellular activity involved," Dr. Li explains. "Now, a few researchers have noticed that if you culture cells in gradually increased concentrations of fluoride, they develop a resistance to it. We wonder how that can be possible if fluoride enters the cell freely—does the cell develop some kind of mechanism for resistance? Are there genetic changes? It's not clear what happens. After nine months, we have cultured cells that can survive in 67ppm of fluoride, a concentration that would certainly kill "normal" cells under normal circumstances. We want to learn exactly how fluoride enters the cell, and how cells are able to exclude it."

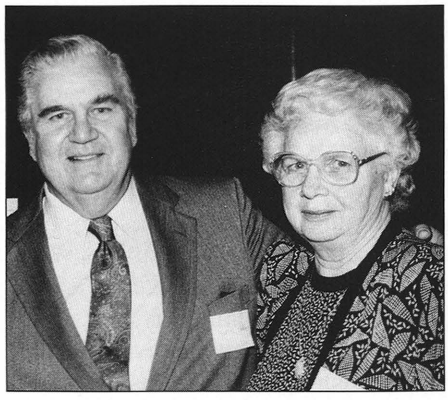
Since the laboratory is intended as a core facility to serve faculty and students, Dr. Li welcomes and encourages other researchers to use it for their own projects. A faculty member from the periodontics department has been looking at the physiologic healing process in regard to periodontal pockets. "Two graduate students have completed studies in our lab thus far," says Dr. Li, "and this summer four NIH-funded student researchers have been working on projects, including students from special high school and college programs who have assisted with Institute studies. The future for this type of biomedical research at the IU dental school looks very bright."

Reception Draws Record Number of IUSD Donors

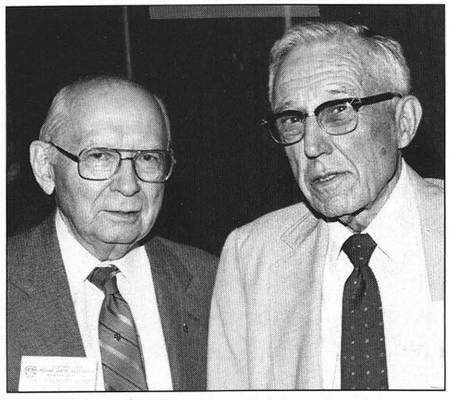
More than 400 of the IU School of Dentistry's strongest supporters gathered at the Indianapolis Hyatt Regency on May 3 for a reception held in recognition of their generous contributions to the school during the last year. Serving as host for Century Club I and II Fellows and their guests was Dr. H. William Gilmore, dental school dean. IUSD sponsors the annual springtime event to acknowledge the many individuals whose gifts play a vital role in the overall quality of the program in dental education offered to students at IU.

On behalf of the School of Dentistry's faculty, students, and staff, the editors of the *Alumni Bulletin* wish to thank every member of the alumni and other friends of the school who have helped IUSD maintain its position among the finest dental schools in the country.

A complete list of the dental school's gift givers will appear in a special edition of the *Alumni Bulletin* to be published in the fall. Photos taken by Mike Halloran and Susan Crum during the Century Club Reception follow (all identifications left to right):

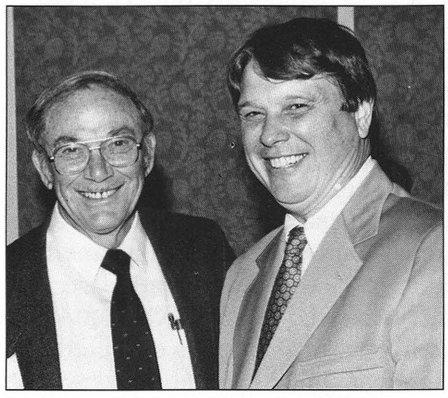


Dr. and Mrs. Jack ('50) Vorhies



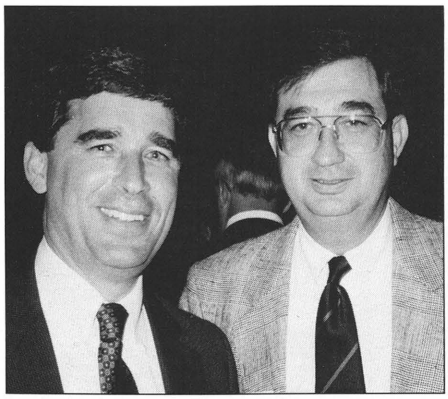
Drs. Maynard Hine and Ernest Porter ('40)

Ms. Wendi Sartain; her parents, Dr. and Mrs. Jack ('60) Portzline; and Dr. and Mrs. Joseph ('75) Jacobi



Drs. Paul Starkey ('43) and David Avery ('66)

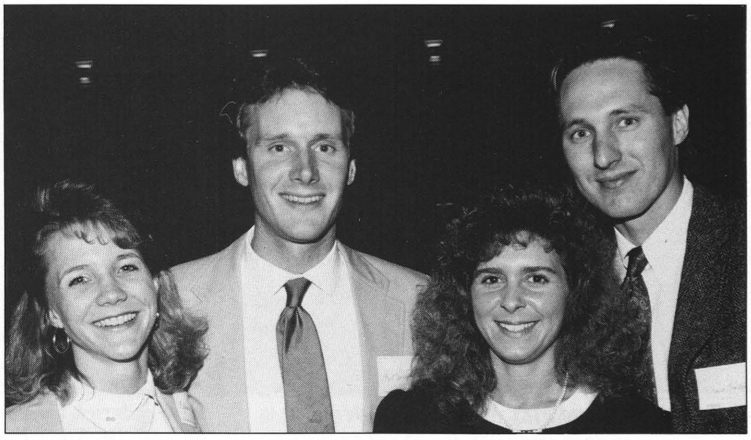
Dr. and Mrs. Donald ('35) VanGilder



Mr. Robert Kleymeyer and Dr. Gene Hedrick ('59)

Dr. and Mrs. Ronald (MSD '73) Harris, and Lorraine Borkowski, wife of Dr. John Borkowski

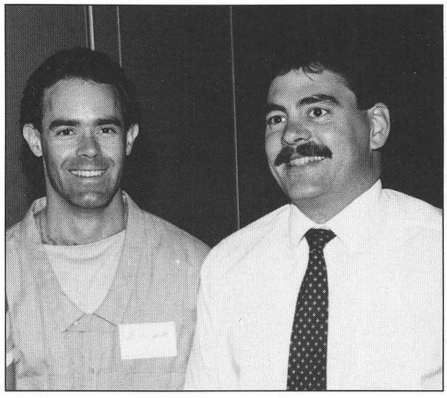
Dr. and Mrs. David ('77) Bussard



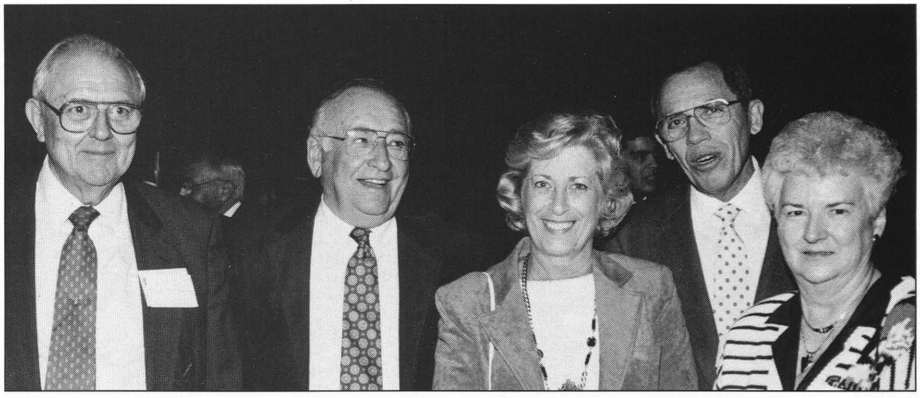
Ms. Rebecca Ruehl, Dr. Kurt Van Winkle ('87), Dr. Christine Borkowski ('87), and Mr. Craig Ogden

Third-year dental student Jay Cowan and parents, Dr. and Mrs. Richard ('63) Cowan

Dr. and Mrs. Lon ('60) Rooksby and Jackie Hennigar (ASDH '58), wife of Dr. James Hennigar ('60)

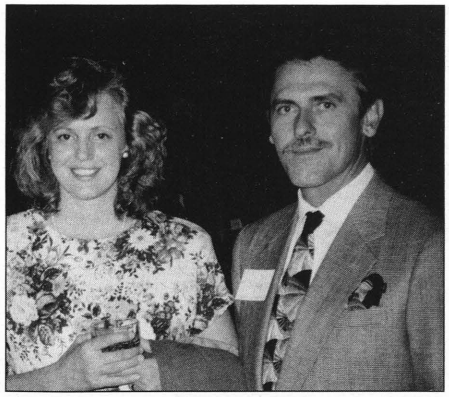


Dr. Bruce Smith ('81) and Dr. Tom Quill ('88)

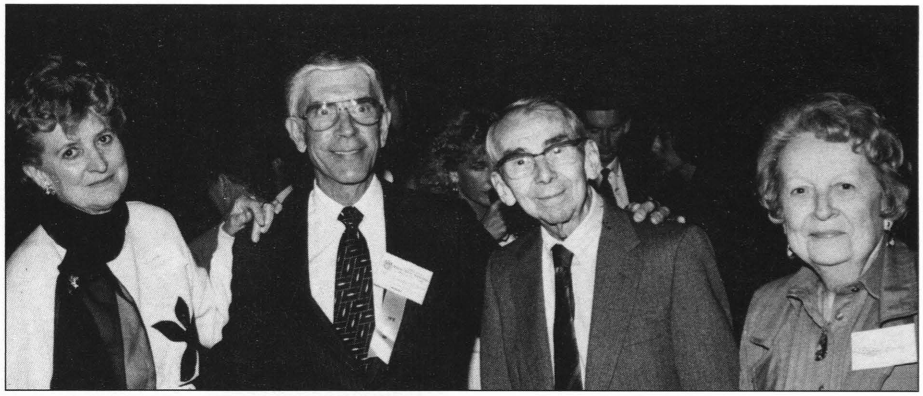


Dr. Marion Warpenburg ('54), Dr. and Mrs. Robert ('54) Shirey, and Dr. and Mrs. Donald ('54) Fread

More Century Club Fellows



Dr. and Mrs. Robert ('72) Sexton



Dr. Lucreda Hutton with her husband, Dr. Charles Hutton ('52), and Dr. and Mrs. Rush Bailey

Dr. Richard G. Shaffer with Dr. and Mrs. William ('62) Hohlt

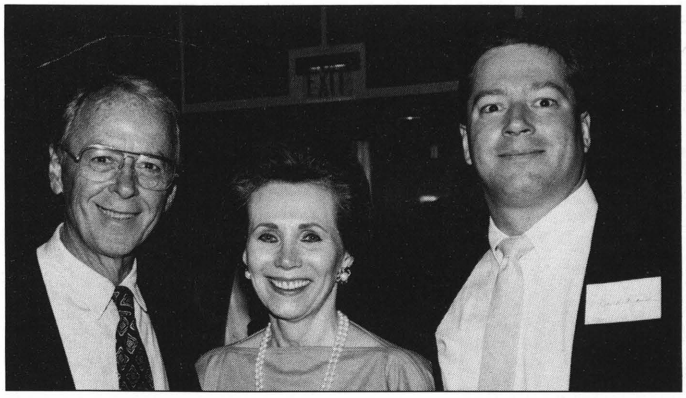
Dr. Frederick Cantrell ('50) with Dr. Samuel Patterson ('40) and his son, Dr. Steve Patterson ('81)

Dr. Jerry Hickman ('65) and his wife, Sharla (ASDH '65), with Karen Compton, wife of Dr. Duane Compton

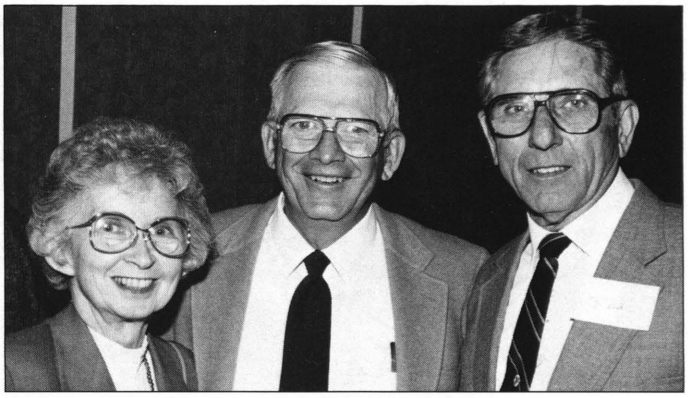
Dr. Douglas Reed ('74) with Dr. and Mrs. Philip ('78) Gardner

Judy Frey, wife of Dr. James Frey ('62); Alice Simons, wife of Dr. Charles Simons ('68); and Pat Rahe, wife of Dr. John Rahe ('63)

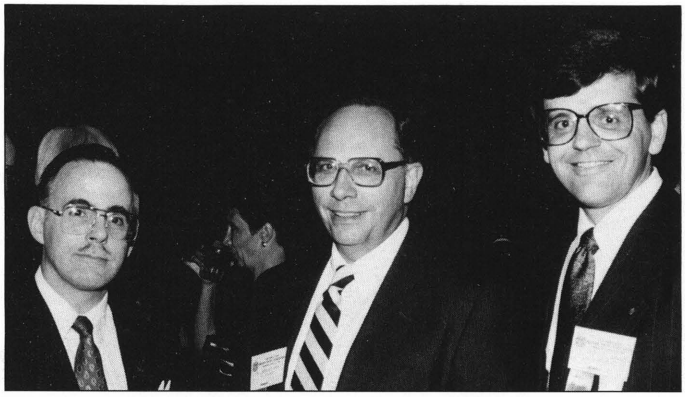
Dr. Pamela Steed ('83) and her husband, Mr. Peter Furno



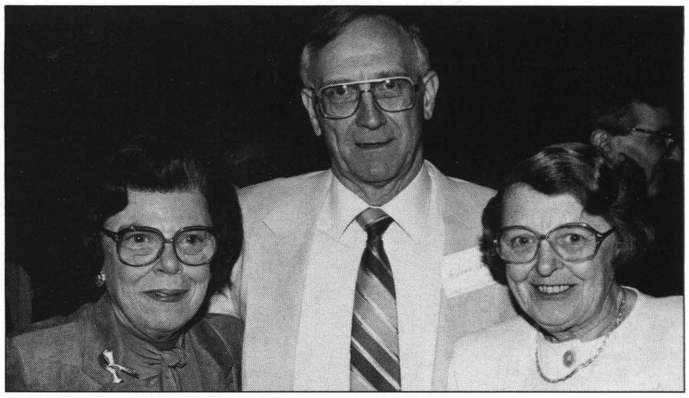
Dr. James Krause ('54) with his wife, Carol, and his son, first-year dental student David Krause



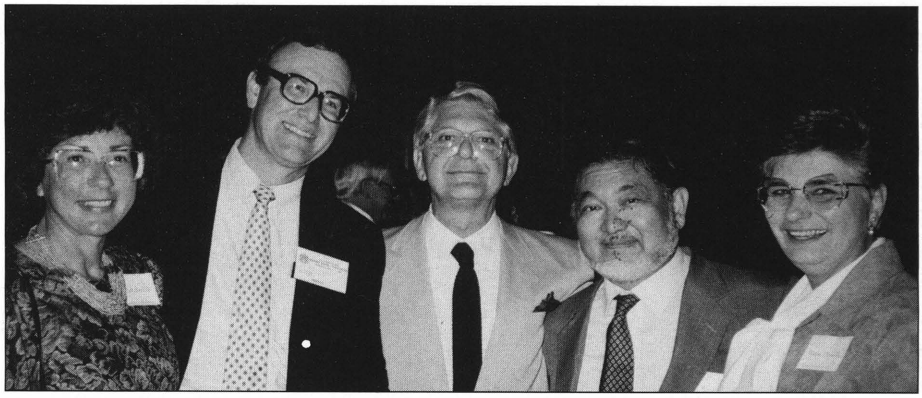
Dr. and Mrs. Stanley Carr with Dr. Charles Gish ('49)



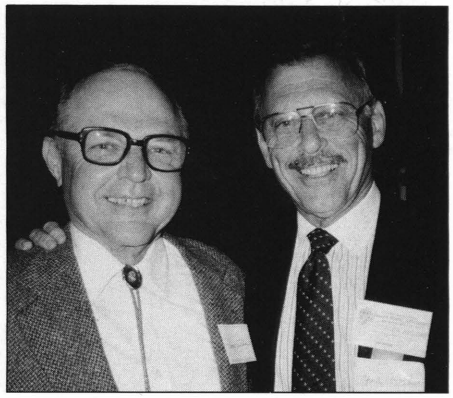
Drs. Clay Stuckey ('75), Richard Fox ('63), and Gary Brown ('75)



Dorothy Phillips, wife of Dr. Ralph Phillips; Dr. Richard Henry ('60); and Professor Marjorie Swartz

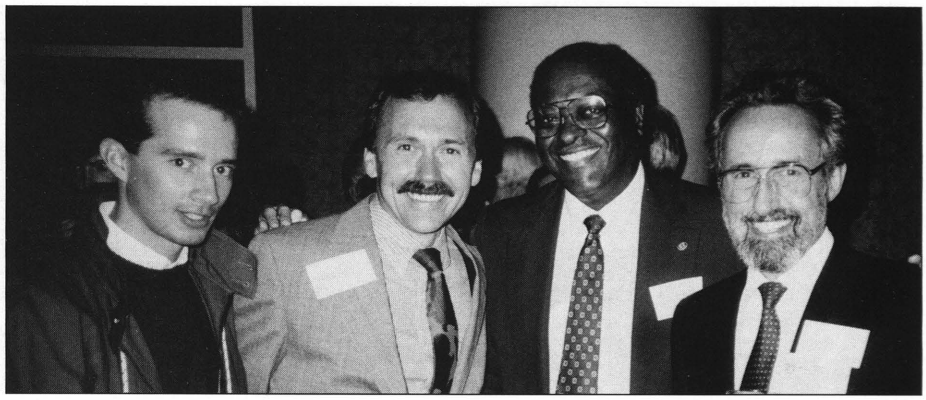


Dr. and Mrs. Phil ('68) Pate, Dr. John Borkowski ('55), and Dr. and Mrs. Ray ('60) Maesaka



Dr. James Dirlam ('50) and Dr. Charles Redish ('51)

Dr. Cynthia Molenda ('79) and her father, Dr. Edward Molenda ('57)



Dr. Tim Gossweiler ('89), Dr. Lloyd Hagedorn ('66), Dr. LaForrest Garner ('57), and Tim's father, Dr. Karl Gossweiler ('61)

Century Club continued...

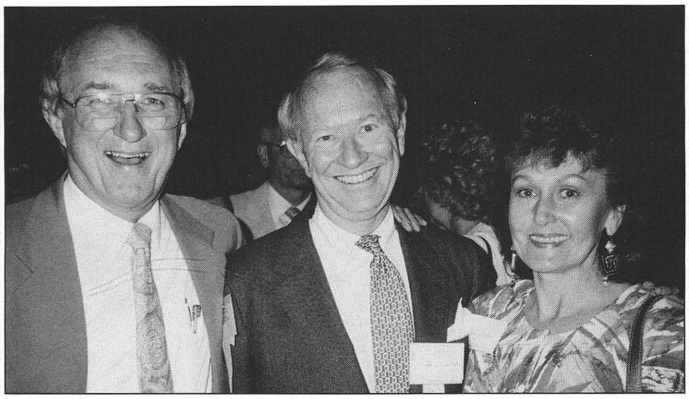
Mr. Jim Bliss, Dr. George Stookey (PhD '71), Dr. Mark Mallatt ('75), and Mr. Lawrence Farrell

Dr. and Mrs. Peter ('47) Ferrini

Mr. Max Skirvin, Dr. Timothy Seiler, and Ms. Gail Plater, all of the IU Foundation

Barbara Phillips, wife of Dr. Lloyd Phillips ('54); Dr. Eugene Brinker's daughter, Julie; and Billie Platt, wife of Dr. James Platt ('61)

Mr. Chalmer Crose, husband of Dr. Virginia Crose, with Dr. and Mrs. Guthrie ('54) Carr



Dr. Robert Moon ('58), Dr. John Gorman, and Dr. Moon's wife, Donna

Dr. and Mrs. Greg ('79) Berger

Dr. Lesley Gilbert ('86) and Dr. Gary Schinbeckler ('72) with Dr. and Mrs. Charles (MSD '68) Tomich

Dr. Charles Nelson ('76) with Dr. and Mrs. Joseph ('69) Lovasko

Dr. James Weddell ('77); his wife, Dr. Karen Fischer ('85); and Dr. Virginia Crose ('68)

Drs. Charles Steffel ('78), Charles Kerkhove ('62), and Duane Compton (MSD '66)

Dr. Robert Modlin ('59) with Karen Masbaum Yoder (MSD '83) and her husband, Dr. Keith Yoder ('63)

Dr. and Mrs. Miles ('45) Standish with Dr. and Mrs. Robert ('54) Bogan

Dr. and Mrs. Clyde Parker with Helen O'Connor, wife of Dr. Monte O'Connor ('60)

Dr. Jeffrey Dean ('83) and his wife, Barbara (ASDH '77) with Treva Gish, wife of Dr. Charles Gish

Guarding against HBV at the IU Dental School

Charles J. Palenik, associate professor of oral microbiology, provides an update on the national incidence of hepatitis B and a description of the HBV vaccination program for Indiana University's dental school employees.

The hepatitis B virus (HBV) is an infectious agent associated with acute and chronic hepatitis. Worldwide, HBV is a major cause of necrotizing vasculitis, cirrhosis and primary hepatocellular carcinoma.[1,2] HBV can be found in blood and blood products and other body fluids such as semen, tears, feces, urine, vaginal secretions and saliva. HBV is transmitted parenterally (including IV drug abuse and needle-stick accidents), by sexual contact, and from mother to fetus or infant. The virus is environmentally stable, thus allowing for indirect transmission such as with contaminated needles or instruments.[1-4]

In spite of the development of three protective and safe vaccines, the number of reported cases of HBV infection in the United States has not decreased over the last seven years.[5,6] Since 1982, when the first HBV vaccine became commercially available, the annual incidence of infection has remained relatively constant at 292,000 cases (Table 1).[5] In contrast, seven years after licensure of the polio and measles vaccines, the incidences of those diseases decreased by more than 95%.[3]

Of the 292,000 annual cases, about 10,000 require hospitalization. Infection becomes chronic (i.e., viral persistence in the absence of antibody formation for over six months) in 5-10% of cases. These individuals are among the estimated 500,000-1,000,000 virus carriers in the United States. More than 250 of the 292,000 will die of fulminant hepatitis, and over 4,500 will eventually succumb to HBV-related chronic liver disease and/or cancer of the liver. Only 30% of HBV cases develop in low-risk groups. The remaining occur among high-risk, often "hard-to-reach" populations such as IV drug abusers, sexually active homosexual males or heterosexuals with multiple partners.[5-7]

The economic impact of HBV infection in the United States is an estimated $1 billion per year.[3] This includes direct medical costs and indirect costs such as lost productivity. The application of HBV vaccine to high-risk individuals has proven to be cost effective.[2,3,5,8]

TABLE 1

Estimated Number of Annual Hepatitis B Infections by Risk Group*

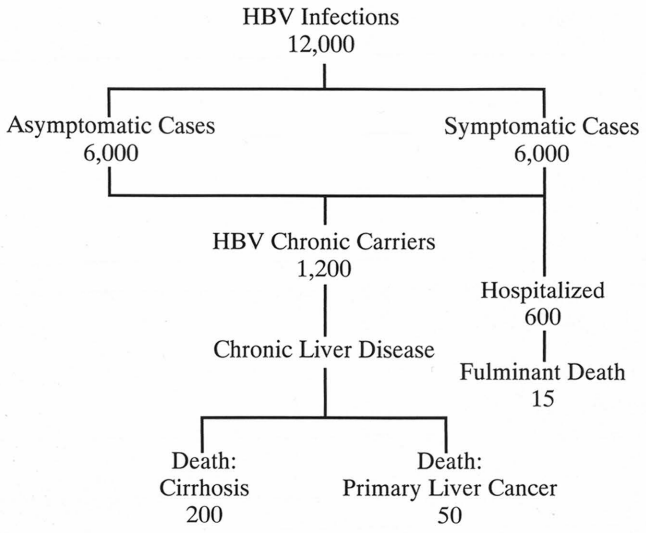
Total Infections in USA	292,000
IV Drug Abusers	81,000
Heterosexuals	63,000
(contracted sexually or by sharing household items—e.g., toothbrush, drinking cups)	
Homosexual Males	27,000
High-Risk Health Care Workers	12,000
Transfusion/Dialysis	9,000
Unknown	100,000

*modified from Reference 6

Professor Palenik is chairman of the IUSD Infection Control-Hazardous Materials Committee. He and Dr. Chris H. Miller, chairman of oral microbiology, edit Dental Asepsis Review, *a newsletter for dentists who are registered with the IU dental school's sterilization monitoring service, now serving nearly 1,500 dentists in Indiana and elsewhere. Professor Palenik was recently named chairman of the newly created IUPUI Laboratory Safety Committee.*

FIGURE 1

Hepatitis B Infections Per Year Among High-Risk Health Care Workers in the U.S.*



* modified from References 5, 6

Concerns have been expressed about en utero viral transmission. HBV carrier rates among pregnant women in the United States are low at about 0.5%. However, rates among African or Asian women often exceed 10%. HBV probably will not be well controlled until the HBV vaccine becomes part of the usual childhood regimen of vaccines. Successful immunization of low-risk children and adolescents will markedly reduce disease development in the next generation.[2,3]

HBV and Health Care Workers

Hepatitis B virus infection remains a major problem for health care workers. HBV, although common, has received considerably less attention than have occupationally-related infections associated with the human immunodeficiency virus (HIV). Accidental needlestick while treating a patient can result in the transmission of over 20 infectious diseases.[9] Needle sticks with HBV-positive patients result in practitioner infection in up to 40% of the cases. As many as 30% of all American health care workers show serologic evidence of past or present HBV infection.[3] Obviously, HBV is an extremely infectious virus and continues to be a major occupational risk for health care workers, especially those with sanguineous contact.

The Centers for Disease Control has estimated that 12,000 health care workers annually become infected on the job (Figure 1).[5,6] Over half have few or no symptoms but are infectious. Ten percent of symptomatic cases (500-600 individuals) require hospitalization with an average stay of seven days. Of 12,000 new cases, 5-10% or 600-1200 individuals will become chronic carriers and about 250 of them will die from HBV-related cirrhosis or liver cancer. Counting fulminant deaths, 265 of the 12,000 (2.2%) will have significantly shortened life-spans. All 12,000 are capable of transmitting the virus and chronic carriers are able to shed HBV for extended periods, even years.

Fortunately, infectious health care workers appear to be at low risk concerning HBV transmission to their patients.[2,10,11] The only fatal cases reported involved infection from a dentist.[12] However, there have been multiple reports of nonfatal HBV transmission from physicians and dentists to their patients.[13-18] The route of transmission in most cases was considered to be via ungloved hands with breaks in the skin. The routine wearing of gloves has significantly decreased reports of practitioner-to-patient infections.

Even though HBV infection remains a major occupational hazard, immunization among health care workers has progressed slowly.[2,13,19-21] Reasons given for refusing immunization include cost, lack of information about the vaccines, concern about product safety, pregnancy-related issues, and considering oneself not to be at risk. Cost has been a common complaint among dental auxiliaries.[22] Numerous hospital reports indicate that the highest compliance rates are obtained when the vaccine is offered without cost to employees.[2,13,17-19,23]

Dentists and dental hygienists lead all health care groups in the HBV immunization movement. Surveys indicate that between 60-80% have been vaccinated.[22,24] This is fortunate because dental personnel have traditionally suffered alarmingly high rates of HBV infection (Table 2). For example, before 1982 dentists had an HBV serologic marker prevalence of 14-15% with an annual attack rate of 2-6%.[25-27] An estimated 13-16.9% of dental hygienists and 12.9% of

TABLE 2

Prevalence of HBsAg Markers* in Selected Populations of American Dental Personnel**

Classification	*Percent Positive*
Oral Surgeon	18-30
Endodontist	9
Surgical Specialist***	14
General Practitioner	7-16
Periodontist	9.1
Dental Hygienist	13-16.9
Dental Assistant	12.9
Dental Techologist	14.2
Office Clerical	8.9
General Population	3-5

* HBsAg and/or anti-HBsAg ** modified from Reference 25

*** group included endodontists, oral surgeons and periodontists

dental assistants have evidence of a current or past HBV infection.[27,28] An estimated 3,000 dentists currently are chronic HBV carriers.

Immunization for Hepatitis B

Three HBV vaccines are currently available in the United States: *Heptavax-B* (plasma-derived product, Merck, Sharpe & Dohme, Rahway, NJ, available since 1982); *Recombivax-HB* (recombinant yeast product, Merck, Sharp & Dohme, available since 1986); and *Engerix-B* (recombinant yeast product, Smith Kline & French Laboratories, Philadelphia, PA, available since 1989). To date, an estimated 1,500,000 people in the U.S. (primarily health care workers) have received one of the vaccine series.[29]

Numerous studies have indicated that the vaccines are safe and effective.[2, 6,30-34] Age (over 35-40 years), smoking, obesity and genetic factors have been related to lower seroconversion rates.[2,35,36]) Major side effects include transient injection site soreness and/or mild systemic symptoms such as fever or headache.[2,34] Allergies to yeast or iodine (the preservative agent used) are extremely uncommon.

Heptavax-B is currently being phased out of production, leaving the two recombinant products. Studies indicate the recombinant vaccines, when applied intramuscularly to younger, healthy adult populations, can result in seroconversion rates of 95-98%.[2,30,37] It appears that the two vaccines are equally effective, safe and interchangeable. Today, there is no single immunization schedule that must be followed. However, it is anticipated that soon the CDC will advocate (depending upon the product used and the HBV exposure situation presented) the use of a three- or four-injection schedule followed by a single "booster" injection given seven to 10 years later.[2,3] The standard dosing regimen for either recombinant vaccine is a 1 ml injection at 0, 1 and 6 months. When rapid completion of the series is necessary (e.g., after a needlestick accident) *Engerix-B* has an accepted injection regimen of 0, 1, and 2 months. However, if prolonged antibody titers are desired, an additional injection must be given at 12 months. Immune globulin can be given simultaneously with the HBV vaccine without affecting the levels of antibodies that develop.

Post-screening within six months of completing the series is an important component of an HBV vaccination system. It is a valuable method to determine seroconversion levels of at least 10 mIU/ml, the minimum titer considered to be protective.[2,38,39] Individuals with initially low antibody levels will probably not respond to subsequent injections. However, when required, a single additional injection should be given, followed by another post-screening. Serological testing and the application of booster shots in the years following the series are important because it is now known that individuals who successfully seroconverted initially became infected with HBV later on (e.g., after seven years).[2,40]

OSHA Regulations

For more than three years the Occupational Safety and Health Administration (OSHA) has been preparing a set of regulations concerning occupational exposure to blood-borne pathogens. On February 27, 1990, OSHA released an updated set of instructions.[41] The purpose of the instructions is to help provide uniform inspection procedures and guidelines to be followed when the agency conducts inspections and issues citations under Section 5(a)(1) of the Occupational Safety and Health Act of 1970. Section 5(a)(1), better known as the "General Duty Clause," states that "Each employer shall furnish to each of his employees employment and place of employment which are free from recognized hazards that are causing or likely to cause death or serious physical harm to his employees." The instructions help dental offices become more aware of the review methods and criteria used by OSHA. These regulations will remain in effect until OSHA publishes its final set of infection control regulations sometime in 1991.[41,42]

Section 5(a)(1) addresses the issue of HBV vaccination in specific terms. It reads: "The facility's infection control policy regarding hepatitis B vaccinations shall address all circumstances warranting such vaccinations and shall identify employees at substantial risk of directly contacting body fluids. All such em-

ployees shall be offered hepatitis B vaccinations free of charge in amounts and at times prescribed by standard medical practices."[41]

The phrase "free of charge" had been added since the previous set of instructions was released on August 15, 1988. Studies conducted in hospital situations indicate that high levels of HBV immunization can not be achieved unless the vaccine is offered without cost. Even under those circumstances compliance often has been disappointing. One factor consistently offered by recalcitrant health care workers is the vaccine's high cost.

Employers are to identify those persons with "substantial risk of directly contacting body fluids." There is no minimum number of exposures per week/month that qualify or disqualify a person. Such individuals are to be informed of 1) their occupational risk; 2) the existence of protective and safe vaccines; and 3) the availability of the vaccine without cost. Obviously, a successful HBV vaccination system is one part of an effective office infection control program. Employees can refuse to be immunized; however, employers should require these individuals to read and sign some type of informed release form.[43] Persons who initially decline can seek vaccination at a later date. Dental offices should keep detailed histories of HBV vaccinations as part of their overall employee medical records system.[41,43]

HBV Vaccination Program at IUSD

Within six months of the release of the first commercial HBV vaccine, *Heptavax-B*, the School of Dentistry began its initial immunization program under the direction of IU faculty members S. Miles Standish and Donald R. Tharp. A total of 106 staff and faculty members from the school's various clinical departments and programs participated. Initial injections were given by the IUPUI Student-Employee Health Service in mid-December of 1982. Most participants received their third injections during the second and third weeks of June, 1983.

All injections at IUSD were given intramuscularly in the arm—a fortunate choice since studies have shown that injections given in the hip have been 25-33% less effective.[2,3] Side effects were minimal with transient sore arms and mild fevers being the most commonly reported complaints. Unfortunately, serologic post-screening was not part of the program, so the group's success rate in seroconverting was not determined.

Even though *Heptavax-B* is a plasma-derived vaccine, few IUSD staff or faculty members declined to be immunized. Apprehension among health care workers in the United States concerning a vaccine composed of viral components obtained from chronic HBV carriers did not peak for several more years. By 1984 the relationship of blood exposure and infection with HIV was well established. It was also well known by then that many of the chronic HBV carriers used in the making of the vaccine were also male homosexuals. Originally compliant groups became overtly reluctant to become vaccinated. When a serologic test for HIV became available, vaccine lots were immediately tested. None were found to contain any viable viral particles, including those of HBV and HIV. The triple purification processes used to produce the vaccine rendered it harmless. There have never been any reported vaccine-associated infections with HIV, HBV or any other hepatitis virus. However, when the rates of new immunizations among health care workers began to decline, a number of pharmaceutical companies began development of a more "psychologically" acceptable vaccine, one that would be derived recombinantly from yeast cells. Such efforts were heavily dependent on emerging genetic engineering technology. The first of the recombinant HBV vaccines to be licensed in the United States was *Recombivax-HB*, which became commercially available in 1986. *Engerix-B* was licensed last year.

In the spring of 1987 the IUSD Infection Control Committee approached Dean H. William Gilmore concerning a second round of HBV vaccinations. Over half of the 1982-83 vaccine group no longer were employed at the School and the vaccination status of their replacements was unknown. Dean Gilmore accepted the scientific aspects of the petition and reiterated the school's responsibility to protect its faculty and staff members as best as possible. He instructed the Committee to determine the number of at-risk individuals so that program costs could be estimated, and to devise a vaccination program that would protect at-risk individuals and also be sensitive to their concerns.

By 1987 it was known that individuals other than those who work directly chairside (e.g., dental laboratory technologists and receptionists) were occupationally at risk for HBV. It was determined that the potential list of vaccine recipients would have to be enlarged to include these individuals and others. Chairpersons and directors were instructed to identify all at-risk staff and faculty and to determine if they had been vaccinated. Those defined as being "at risk" were:

1. employees (both full- and part-time) who have ANY direct patient contact (contact may be for treatment, examination, diagnosis or research purposes)
2. persons who do not have direct patient contact but who handle orally-soiled materials and other items related to treatment (e.g., patient files; dental impressions; dental instruments, including sterilization; operatory equipment, including clean-up and maintenance)

3. persons who are not members of the above groups but feel they are at risk for contracting hepatitis B on the job

After a thorough review of the proposed vaccination program (this time using the *Recombivax-HB* series), Dean Gilmore approved it; funds to cover the initial cost (approximately $27,000) were identified through a variety of sources including the school's General Fund, an external donation, the Department of Oral Microbiology and the IUSD Oral Health Research Institute.

Important to the success of the program was distribution of accurate information pertaining to it; the Infection Control Committee sent every faculty and staff member judged to be at risk an information packet describing the vaccination program. Central concerns included safety, efficacy and pregnancy-related issues. Employees were strongly encouraged to recognize their occupational risk. Any employee was free to decline the vaccine, but all were required to read and sign an informed release form. Each was told that he or she could be vaccinated at a future date.

A total of 171 staff and faculty members were invited to receive their initial injections at the school during the third week of September in 1987. Later, an additional 15 were brought into the program. Nurses from Student-Employee Health Service came to the school to administer the injections. They also maintained the dates of each person's vaccinations. Eight individuals declined to be vaccinated, each because of pregnancy-related issues. Within a year all at-risk employees still working at the school had begun the vaccine regimen. Fifteen recipients complained of vaccination side effects, most involving injection site soreness or redness. There were a few reports of fever, headache and joint pain.

The third injections were given in mid-March of 1988. At that time eight individuals had not completed either their first and/or second injections. They were reminded by telephone of their continuing risk for HBV and of their need to be vaccinated. All members of this group eventually were vaccinated.

Ten weeks after completion of the injection series, personnel from The Medical Laboratories, a local clinical laboratory company, came to the school on three occasions to draw blood for post-screening. The samples were tested only for antibodies to HBV surface antigens (anti-HBsAg). Each employee received the original copy of his or her immunization results with a note explaining them. Eleven individuals were hyporesponders with values of 2.1-10 mIU/ml. All received at least two additional booster injections. All but three eventually seroconverted to levels above 10 mIU/ml. There were two non-responders. Neither seroconverted to additional injections, and neither was determined to be a chronic HBV carrier. Therefore, the seroconversion rate for the initial injection series was 93% (97.3% after additional injections). High seroconversion rates (+95%) are expected among healthy, younger adults. Because a large number of the IUSD recipients were over 40 years old, the program was considered highly successful.

Individuals vaccinated during the original 1982-83 program or by some other mechanism were offered booster shots five years after the completion of their initial series. Post-screening was performed this time to insure seroconversion. This was especially important for this group because few had been serologically monitored after their first vaccinations.

The entire process is now repeated whenever an unvaccinated at-risk employee is identified. Each year all departments and programs are asked to audit their personnel concerning HBV risk and vaccination status. New information concerning HBV infection and vaccination is distributed at the school's annual infection control/hazardous materials in-service training sessions and as needed.

Students at the School of Dentistry, like faculty and staff, are exposed regularly to blood and blood products which place them at risk for HBV infection. Since 1987, all students (pre- and postdoctoral, dental hygiene and dental assisting) have been required to be vaccinated at their own cost (approximately $110). The series of three injections must be started before students are permitted to enroll in fall semester of their first year. Students who have begun the series with their personal physicians may have it completed by the IUPUI Student-Employee Health Service if the physician provides the vaccine. Students who arrive on campus without having initiated the series are directed to the IU Family Practice Center at Long Hospital.

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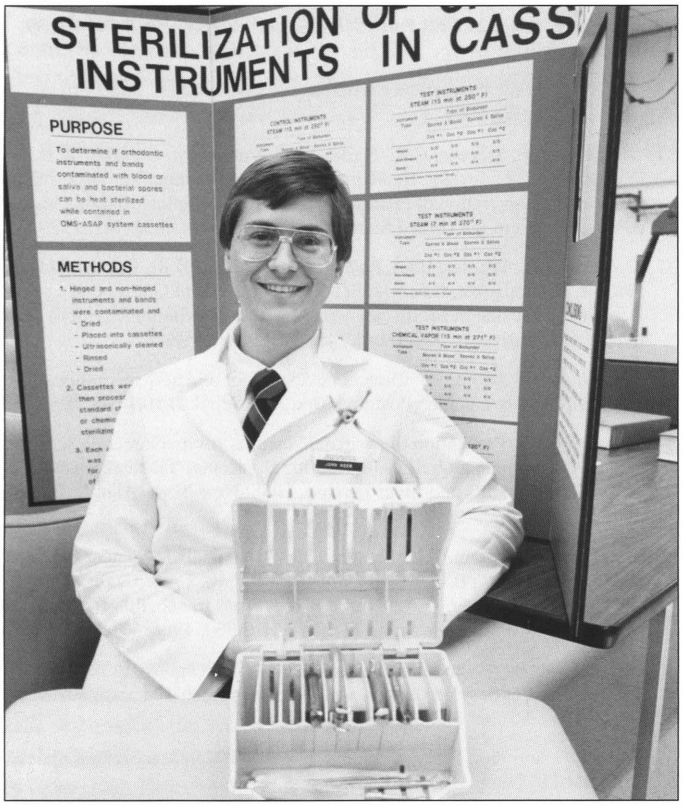
John M. Neeb Bound for Boston



First-year dental student John M. Neeb and his award-winning clinic

From left: Jenaye Krepshaw, Amy Knoebel and Susan Chapel receive the top award in the dental assisting category, presented by the dental school, for their clinic, **White and Bright.**

Drawing on his pre-dental school experience as a research technician at the Indiana University School of Dentistry's Oral Health Research Institute, first-year student John M. Neeb prepared a scientific clinic that took the top prize during the annual American Dental Association/Dentsply International Student Clinician competition held at the dental school on March 19.

A total of 62 students presented 27 clinics in four categories at Indiana University's Table Clinic Day this year, according to IUSD Essay/Table Clinic Committee Chairman Charles Palenik. Winners in the dental assisting, dental hygiene, and dentistry categories were announced during the school's Honors Day program preceding IUPUI Commencement exercises on May 13.

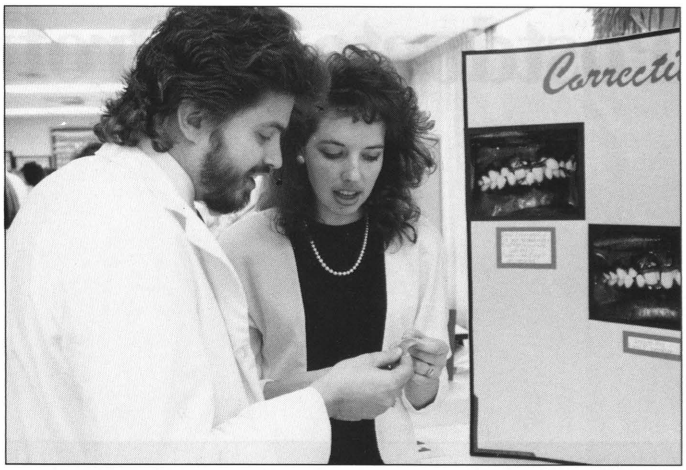
Mr. Neeb's clinic, entitled *Sterilization of Orthodontic Instruments in Cassettes*, pertains to a study he helped conduct for the IU Department of Orthodontics. The purpose of the study was to determine if orthodontic instruments and bands contaminated with blood, saliva and bacterial spores could be heat-sterilized (the department's primary method of sterilization) while contained in OMS-ASAP cassettes.

"Orthodontics involves the use of many hinged instruments, which create a special challenge in the sterilization process," Mr. Neeb says. For the study, cassettes containing contaminated bands and orthodontic instruments (hinged and non-hinged) were subjected to standard steam, dry heat, or chemical vapor sterilization cycles. Results of the study indicated that instruments and bands contained in these cassettes can be effectively sterilized when any of the three types of sterilization cycles is employed. The cassettes are now being used by the orthodontics department.

Mr. Neeb will represent Indiana at the national Dentsply competition, to be held at the ADA's 131st annual session in October. During a brief ceremony held recently in the Dean's Office, Mr. Neeb was awarded a plaque presented by Mr. Richard Case, a district manager of Dentsply's York Division.

A three-way tie for the second-place Dentsply award included second-year dental students Rebecca J.

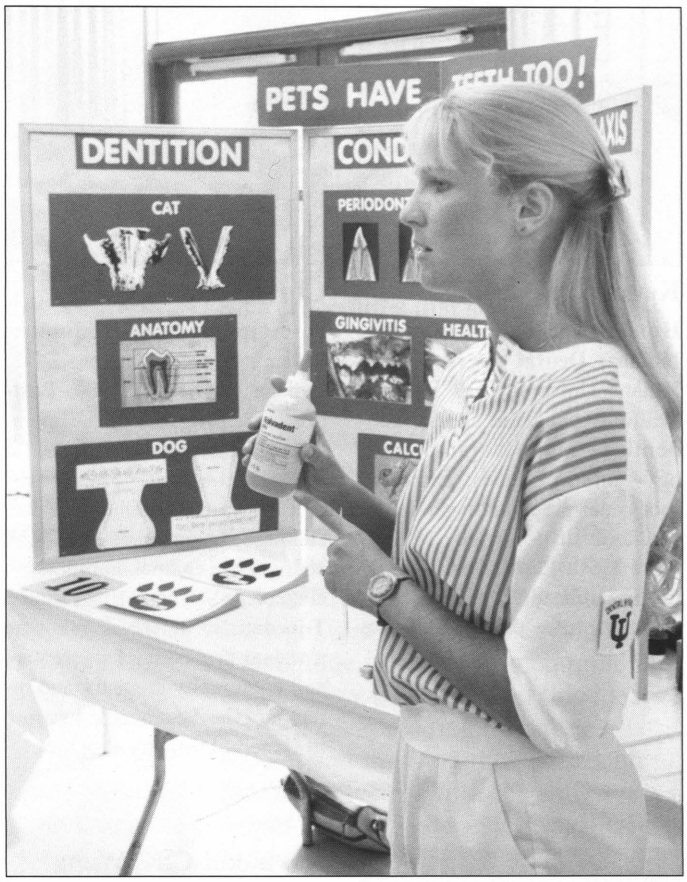
Second-place winner Eric L. Dellinger (right) discusses his clinic, **Influence of Immersion and Spray Disinfectants on Alginate Impressions,** *with Dr. Eugene Roberts, chairman of orthodontics. Mr. Dellinger's award was presented by the School of Dentistry.*



The School of Dentistry also recognized third-place winner Herb Yekel, shown here with classmate Jill M. Frush-Snyder. His clinic was entitled **Enamel Color Modifications by Controlled Hydrochloric Acid—Pumice Abrasion.**

Joseph P. Hartman presents his clinic, **Management of the Developing Dentition of a Nine-Year-Old Female,** *to classmate Catherine L. Byrne. As first-place winner in the dental student category Mr. Hartman received his award from the Indianapolis District Dental Society.*

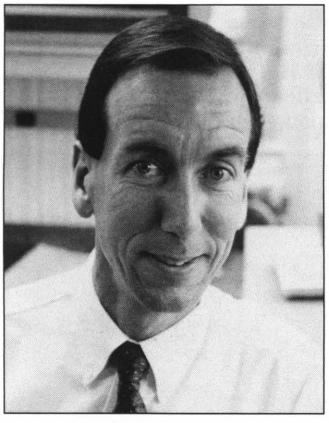
Beaven (*Mutagenic Potential of Toluidine Blue Evaluated in the Ames Test*); Michael J. Behnen (*Antimicrobial Activities of Various Glass Ionomers*); and Ronald L. Steinbrunner (*Reaction of Rat Connective Tissue to Glass Ionomer and Composite Resin Restorations*). They each received cash awards from the Indiana Section of the American Association for Dental Research.



Kristy Ballinger presents the winning clinic in dental hygiene, **Pets Have Teeth, Too.** *Her co-presenters were Mary Ann Partain, Kelley Martin and Karen Long. The award was given by the dental school.*

Postdoctoral Profiles

Photos by Mike Halloran and Susan Crum



Kevin A. Deardorf

Hometown: Indianapolis, Indiana; **Dental degree**: DDS, Indiana University, 1985; **Postgraduate program at IU**: endodontics—major, oral pathology—minor; **Thesis**: Effect of root canal preparation on dentin permeability; **Degree**: MSD, April 1990; **Plans**: Private practice in Indianapolis and part-time assistant professor of endodontics at IU.

Christianne J. Guba

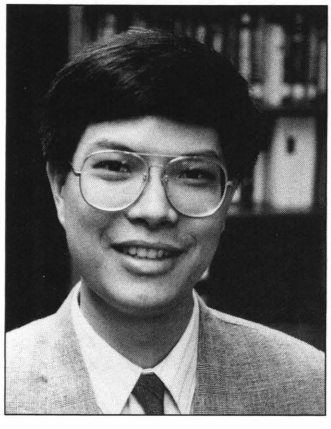
Hometown: Bloomington, Indiana; **Dental degree**: DDS, Indiana University, 1980; **Postgraduate program at IU**: operative dentistry—major, dental materials—minor; **Thesis**: Effects of varied etching time and etching solution viscosity on bond strength and enamel morphology; **Degree**: MSD, May 1990; **Plans**: To continue at IU as full-time assistant professor of preventive and community dentistry and director of the Advanced Education in General Dentistry Program.

Charles W. Pemble III

Dental degree: DMD, University of Louisville, 1974; **Postgraduate program at IU**: oral pathology—major, dental diagnostic sciences—minor; **Thesis**: Flow cytometric ploidy determination of oral premalignant and malignant lesions; **Degree**: MSD, May 1990; **Plans**: Air Force assignment to Armed Forces Institute of Pathology, Walter Reed Army Medical Center, Washington, D.C.

Pamela A. Steed

Hometown: Zionsville, Indiana; **Dental degree**: DDS, Indiana University, 1983; **Postgraduate program at IU**: oral diagnosis/oral medicine—major, oral pathology—minor; **Thesis**: Utilization of contact liquid crystal thermography in the evaluation of temporomandibular dysfunction; **Degree**: MSD, May 1990; **Plans**: To continue practicing at office in the St. Vincent Professional Building, Indianapolis, treating patients with craniofacial disorders/TMJ dysfunction.



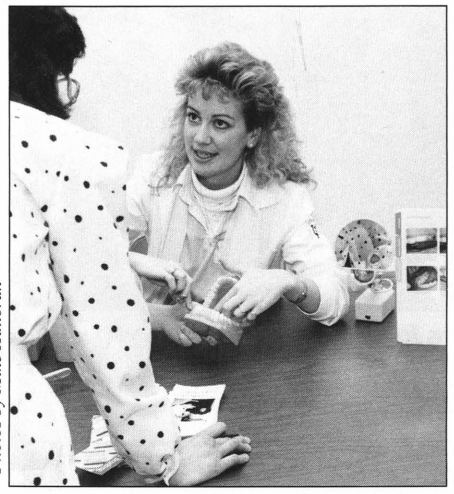
Raymond C.K. Wong

Hometown: Hong Kong; **Dental degree**: DDM, University of the East, Manila, The Philippines, 1985; **Postgraduate program at IU**: operative dentistry—major, dental materials and preventive dentistry—minors; **Thesis**: Effect of two cavity varnishes on microleakage of high-copper amalgams: an in vitro study; **Degree**: MSD, May 1990; **Plans**: Will continue in IU's advanced standing DDS program.

Nisha Jacinta Shenoy

Hometown: Bombay, India; **Dental degree**: BDS, University of Bombay, 1987; **Postgraduate program at IU**: oral pathology—major, radiology—minor; **Thesis**: Analysis of amalgam tattoos with associated lymphoid hyperplasia; **Degree**: MSD, June 1990; **Plans**: Accepted for graduate studies (PhD in oral biology) at the University of Washington, Seattle.

DAE Around Indiana



Photos by Mike Halloran

Dental hygiene student Alison Holsten describes proper brushing technique to a participant of the Goodwill Industries' annual Health Fair.

Dental Hygiene Students on 'Goodwill' Mission

Hundreds of employees of Goodwill Industries of Central Indiana, Inc. participated in a Health Fair sponsored by the organization last March, and students from the IU dental school's dental hygiene program were on hand to offer some tips on the importance of oral health.

Second-year dental hygiene students Alison Holsten, Tellisa Miller, and Amy Wilson provided oral hygiene instruction to many of the employees during the annual event, held at the center on Michigan Street. The students were supervised by Dr. Charles E. Smith, director of the dental division of the Indiana State Board of Health and part-time associate professor of preventive and community dentistry. Approximately 75 employees received dental screenings performed by Dr. Smith.

In addition to dental screenings, the fair offered employees a variety of other health related examinations at no charge, including tests for hearing and seeing.

By participating in this outreach effort, the students were fulfilling requirements for a community dental health course taught by Louise M. Judd, clinical assistant professor of dental hygiene on the IUPUI campus.

SADHA Invites Speaker to IUPUI

Practicing dental hygiene in Switzerland was the topic presented by Susan Alden during a meeting of the Student American Dental Hygienists Association, held at the IU School of Dentistry in March.

Ms. Alden, who is assistant director of the Indiana Heart Institute, Indianapolis, spent a year practicing dental hygiene in a private dental office in Berne in the 1970s. She holds a degree in health service administration from the University of Michigan. The work in Berne was very challenging, Ms. Alden said, because most of the patients in the practice had never been exposed to dental hygiene services. Although her work was difficult, the patients responded positively to oral hygiene instruction, often showing their appreciation by giving her gifts and inviting her to their homes. For dental hygienists interested in working in another country, Ms. Alden recommends that they prepare for the experience by taking classes in the country's language and studying the culture.

SADHA's goal is to inform students of all aspects of dental hygiene and to promote professional activities. Another activity held by the local component this year was a food drive for an Indianapolis shelter for the homeless.

Susan Alden

South Bend Student Receives First Hassel Award

The North Central Dental Society recently established the Dr. Charles E. Hassel Community Service Award for students on the Indiana University South Bend campus. The award has been created to recognize Dr. Hassel for his contributions to the oral health of the public, to his community and to the dental profession, and for his continuous support of the IUSB dental auxiliary programs. Dr. Hassel, a 1967 dental graduate of IU, practices in Bremen.

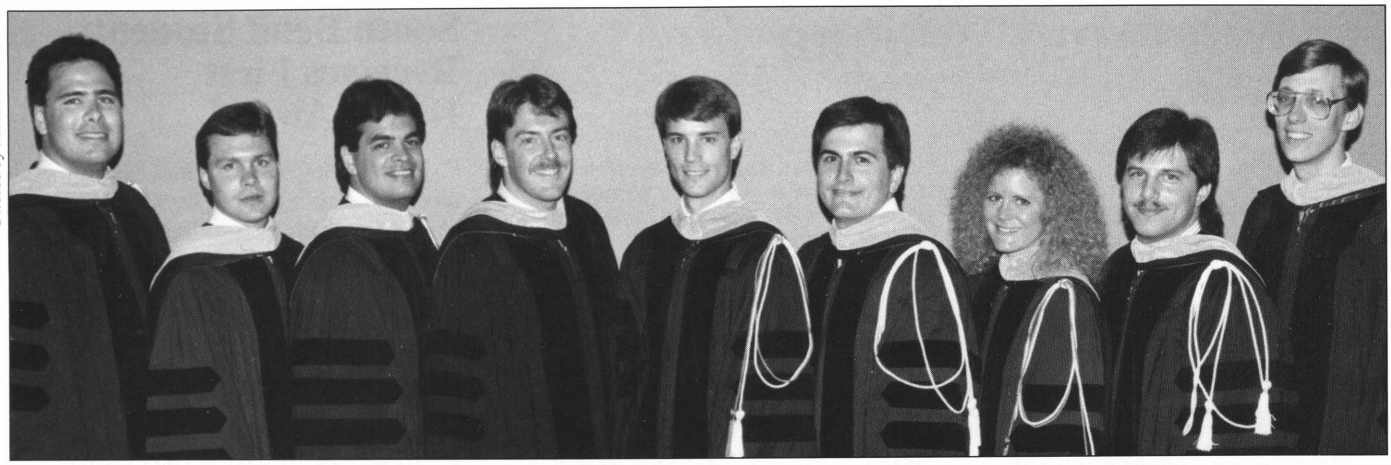
Marci Ann Vogel, of South Bend, is the first senior dental hygiene student to receive the award, which was presented at Honors Day ceremonies held on campus in May. She received the award for demonstrating excellence in activities related to public health.

Appreciation is extended to the following dentists, who served as IUSB faculty practitioners in the dental assisting externship program during the Spring 1990 semester:

Drs. Robert Angelo, Robert Barker, Douglas Bateman, Larry Beachy, Michael Beachy, Dennis Block, Kevin Campbell, Ron Corley, Mark Mihalo, James Douglas, Gilbert Eberhart, Rhett Fagg, Michael Feltman, A. E. Felton, Michael Freid, Daniel Fridh, D. J. Frounfelter, William Gitlin, Harvey Weingarten, Michael Griffee, Nora Harmsen, John Harrington, David Harris, Jay Asdell, Charles Hassel, H. Ray Hazen, Scott Hewitt, Kerry Knape, Timothy Kulik, J. E. Landrum, W. C. Boren, John Lehman, Jr., Vance Lopp, Craig McEwen, Robert McMahon, Don McNamara, James Macri, Debra Mannia, Dennis Miller, Herbert Miller, Roger Miller, Robert Moon, Roger Pecina, Louis Plumlee, David Porter, Mike Rader, Timothy Ravencroft, William Record, Harry Richter, Charles Rosenbaum, Thomas Rykovich, George Schmitt, Paul Sergio, George Smith, Bryan Snook, Jeff Starr, Jan Starr, John Stewart, Thomas Stokes II, David Strycker, Atef Tawadros, Michael Uzelac, Steve Walker, Doug Weber, and Howard Wiesjahn.

Shant Markarian
Director
Dental Auxiliary Education

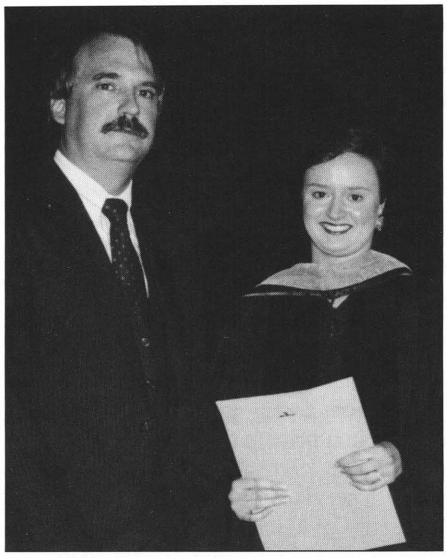
Photos by Mike Halloran



New members of the national honorary societies for dentistry and dental hygiene were inducted during the Omicron Kappa Upsilon/ Sigma Phi Alpha banquet, held at the IUPUI Union Building on May 4. Members of the Dental Class of 1990 inducted into Theta Theta Chapter of OKU are, from left: R. Keith Rooney, who was also named OKU Outstanding Student; Gregory A. Johnson; Owen M. Forbes; John D. Hiester; J. Todd Hunt; Robert Todd Bergman; Joni L. Kluth; J.D. Kisella; and Allen W. Meier.

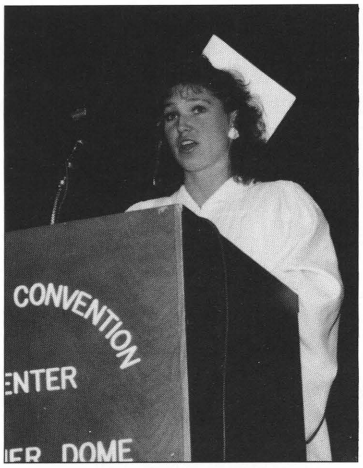
New members of Theta Chapter of Sigma Phi Alpha dental hygiene honorary society are, from left: Cynthia Lyn Seale, Karen R. Long, Nicole G. Thayer, and Kelley Martin Carter

David D. Trigg accepts the American Academy of Oral and Maxillofacial Radiology Award from Dr. Steven L. Bricker.



Kathy M. Patmore is the recipient of the first Dr. Tillman E. Miller Clinical Achievement Award, named in memory of an Elkhart practitioner and IUSD alumnus (Class of 1980) who died last February. Presentation of the award was made by one of Dr. Miller's brothers, Duane L. Miller, M.D., also of Elkhart.

The Hu-Friedy Golden Scaler Award, presented by Professor Evelyn R. Oldsen, went to dental hygiene graduate Cynthia E. Wirth.



Carrie A. Abney, president of the Dental Assisting Class of '90, addresses the Honors Day audience.

Congratulations to IUSD's Newest Grads

Indiana University students of dentistry, dental hygiene and dental assisting donned caps and gowns and stepped into a well-earned spotlight on Sunday, May 13, for Honors Day ceremonies held at the Indiana Convention Center in Indianapolis. Hundreds of well wishers, including friends, family members and others, were in attendance to honor the classes of 1990 and to welcome each graduate into the dental profession. IUPUI commencement exercises in the Hoosier Dome followed.

During the Honors Day program, moderated by Dean H. William Gilmore, 54 awards were bestowed by members of the IU faculty and staff and other Indiana health professionals. The program also included remarks from the presidents of the graduating classes—Carrie A. Abney, for dental assisting; Nicole G. Thayer, for dental hygiene; and Owen M. Forbes, for dentistry.

A list of graduates recognized during Honors Day and at other ceremonies held this spring follows.

Graduating with High Distinction:

Doctor of Dental Surgery
Robert Todd Bergman
J. D. Kisella
Associate of Science, Dental Hygiene
Denise R. Will

Graduating with Distinction:

Doctor of Dental Surgery
P. Bruce Easter
Owen M. Forbes
J. Todd Hunt
Gregory A. Johnson
Joni L. Kluth
R. Keith Rooney
Associate of Science, Dental Hygiene
Cynthia Lyn Seale
Nicole G. Thayer

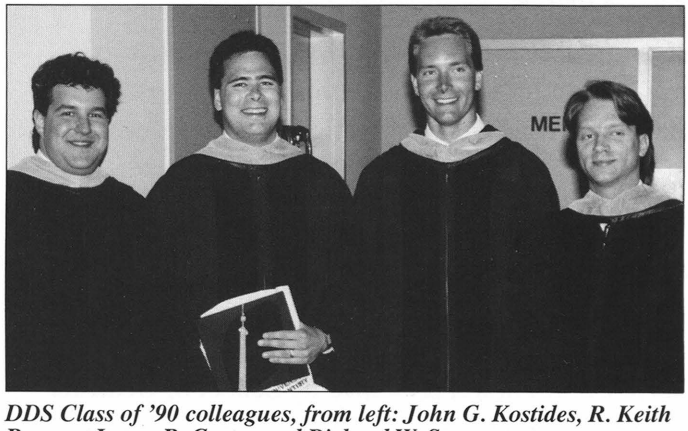
(ASDH Candidates)

Kelley Martin Carter and Ronda L. Lamaster
Rossya Kaufman Memorial Awards in Dental Hygiene, presented by School of Dentistry Department of Dental Hygiene for service in the area of community dental hygiene; named for 1958 graduate of IU's dental hygiene program and established in 1960 in her memory.

Katie A. Lazard
Procter & Gamble Prevention Award, for outstanding achievement in preventive dentistry; presented at the dental school in May.

IUSD Dr. Tillman E. Miller Clinical Achievement Award, second place. New award honors the memory of a 1980 graduate of the IU School of Dentistry and Elkhart practitioner who died February 18, 1990; established by Dr. Miller's family and friends.

Karen R. Long
IUSD Dr. Tillman E. Miller Clinical Achievement Award, first place



DDS Class of '90 colleagues, from left: John G. Kostides, R. Keith Rooney, James R. Castor and Richard W. Spencer

Kelly J. Monaghan
A. Rebekah Fisk Memorial Award of the Indiana Dental Hygienists' Association, for greatest proficiency in clinical practice during the final year of the program; named for IU's first director of dental hygiene who died in 1982.

Jane Ann Sottong
IUSD Alumni Association's Harriett F. Hine Award, for

Dental hygiene graduates, from left: Kelley Martin Carter, Tonna Ellis, and Jean Essex

highest level of professionalism (selected by peers); named for the wife of IUPUI Chancellor Emeritus Maynard K. Hine, who is also a former dean of the dental school. Mrs. Hine died in 1972.

Cynthia E. Wirth
Hu-Friedy Golden Scaler Award, for outstanding clinical performance; named for a dental manufacturing company.

Kelley Martin Carter, Mary Ann Partain, Karen R. Long and Kristy L. Ballinger
Table Clinic Award, presented by School of Dentistry

(Candidates for Dental Assisting Certificates)

Erica L. Baumer
Harriett F. Hine Dental Assisting Academic Award, presented by School of Dentistry

Michelle L. Dunham
Indiana University School of Dentistry Dental Assisting Clinical Achievement Award

Susan M. Chapel, Amy Knoebel and Jenaye L. Krepshaw
Table Clinic Award, presented by School of Dentistry

(DDS Candidates)

April L. West Bardonner
Indiana Society of Periodontists Award, for interest and outstanding achievement in clinical periodontics

American Association of Women Dentists Award, for academic excellence and outstanding leadership

Robert Todd Bergman
Alpha Omega Scholarship Award, for outstanding scholastic record during four years of study; presented by Alpha Omega dental fraternity.

Glenn J. Pell Award, presented by the Indiana Society of Oral and Maxillofacial Surgeons to most outstanding student in oral and maxillofacial surgery who has also been accepted into IU's postgraduate program for 1990. Award named for a pioneer of oral and maxillofacial surgery who was a 1910 graduate of Indiana Dental College and a faculty member at IDC and IUSD for some 30 years. He died in 1954.

American Academy of Oral Pathology Award, for outstanding interest, accomplishment and promise in the field

Indianapolis General Dentistry Study Club Award, for completing more elective courses than any other fourth-year student

Chancellor's Scholar Award, presented to IUPUI students from each school or division during the IUPUI Chancellor's Honors Convocation, University Conference Center, April 20

Lizza M. Corretjer
American Association of Orthodontists Award, for exceptional interest in development of the orofacial complex

Eric L. Dellinger
Block Drug Company's Essay Award, second place, "Influence of Sprayed Disinfectants on Four Types of Impression Materials"

Table Clinic Award, second place; presented by School of Dentistry

Academy of Dental Materials Award, for excellence in dental materials

Quintessence Publishing Company Award, for achievement in research

Owen M. Forbes
American Association of Oral and Maxillofacial Surgeons Award, for outstanding achievement in the field (co-recipient, Christopher W. Potee)

American College of Dentists Indiana Section Award, for civic leadership; presented during the annual

banquet at the Hyatt Regency Hotel, Indianapolis, on May 3.

Gary I. Friedman
Academy of General Dentistry and Indiana Chapter Award, for showing the most promise as an outstanding general dentist

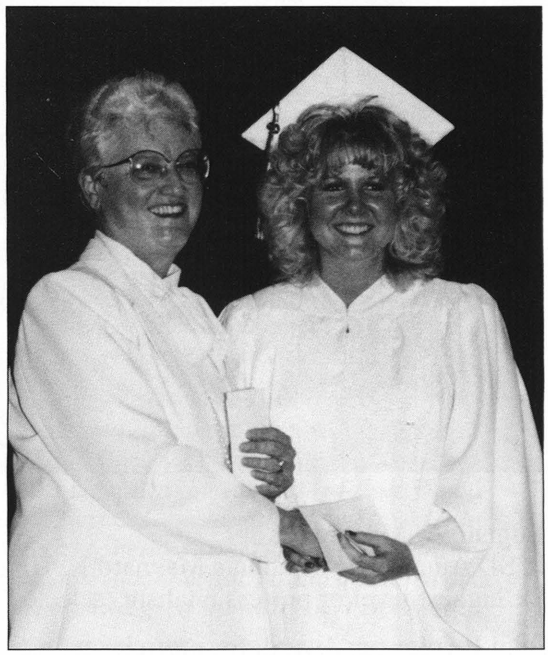
Joseph P. Hartman
Table Clinic Award, first place; presented by Indianapolis District Dental Society

John D. Hiester
American Association of Endodontists Award, for showing greatest interest and exceptional proficiency in endodontics

Indiana Society of Pediatric Dentistry Award, to a dental student who has been accepted into a graduate pediatric dentistry program for 1990

Indiana Dental Association Award, in recognition of services to organized dentistry through American Student Dental Association

The family pitches in to help dental graduate Kevin J. Otte robe up for Honors Day.



The Dental Assisting Clinical Achievement Award was presented to Michelle L. Dunham by Professor Pauline R. Spencer

American Academy of Gold Foil Operators Award, for outstanding qualities as a scholar and clinician in operative dentistry, with proficiency in direct gold restorations

Gregory A. Johnson
IUSD Non-Academic Staff Council Student Recognition Award, for exhibiting the highest level of professionalism

John S. Jorczak
American Equilibration Society Achievement Award, for outstanding performance relating to the science of occlusion and temporomandibular joint function

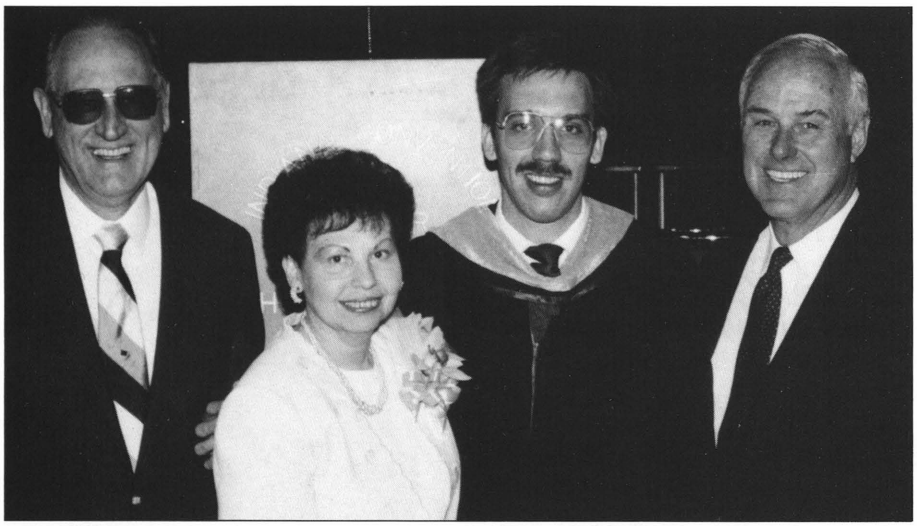
J. D. Kisella
American Academy of Oral Medicine Award, for achievement, proficiency, and promise in the field

Jack D. Carr Memorial Award, for maintaining highest grade point average during four-year program; named for prominent Indianapolis dentist and dental professor who died in 1986.

Dentsply International Merit Award, for outstanding achievement in removable prosthodontics; named for a dental manufacturing company.

Mark E. Lasbury
Block Drug Company's Essay Award, third place, "Criteria for Retention of Teeth as Overdenture Abutments"

Dwight B. Lee
American Academy of Periodontology Award, for achievement in periodontics



Dental graduate Daniel E. Sakel poses with his parents, Mr. and Mrs. Don Sakel (left), and Dean H. William Gilmore

Eugene A. Margiotti
IUSD Alumni Association's Maynard K. Hine Award, for highest level of professionalism (selected by peers)

John F. Johnston Award, for proficiency in fixed and removable partial prosthodontics. Award established by Dr. M. John Borkowski, a 1955 graduate of IUSD who practices in Indianapolis and teaches part-time in prosthodontics at IU. The award is named for a 1921 graduate of the Indiana Dental College and pioneer in prosthodontics who headed fixed and removable partial prosthodontics at IU in the '50s and early '60s. Dr. Johnston died in 1977.

Allen W. Meier
Quintessence Publishing Company Award, for clinical achievement in restorative dentistry

Kathy M. Patmore
IUSD Dr. Tillman E. Miller Clinical Achievement Award

Quintessence Publishing Company Award, for clinical achievement in periodontics

Christopher W. Potee
American Association of Oral and Maxillofacial Surgeons Award, for outstanding achievement in the field (co-recipient, Owen M. Forbes)

Joe E. Richter
International College of Dentists Award, for demonstrating most professional growth and development during dental school

Jill Marie Frush Snyder
American Society of Dentistry for Children Certificate of Merit and Indiana Chapter Award, to most outstanding dental student in the field of pediatric dentistry

Amy E. Sonneborn
Block Drug Company's Essay Award, first place, "Indications and Contraindications of Molar Root Resection: A Report of Two Cases"

David D. Trigg
American Academy of Oral and Maxillofacial Radiology Award, for exceptional interest and proficiency in radiology

James L. Maus Memorial Scholarship Award, for showing most improvement in class rank during dental school; established in 1973 by the Maus family and named in memory of owner and operator of Maus and Elam Dental Laboratories.

Dr. Font-Feel Tseng
Academy of Operative Dentistry Award, for excellence in operative dentistry

Pierre Fauchard Academy Indiana Section Award, for clinical excellence; presented during the annual meeting at the Convention Center, Indianapolis, on May 3.

Herb J. Yekel
Table Clinic Award, third place; presented by the School of Dentistry

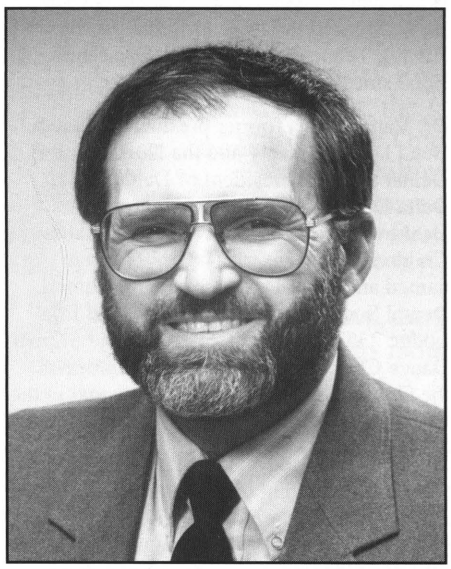
With the Classes...

Dr. C.E. Smith Named Director of ISBH Dental Division

Dr. Charles E. Smith ('61), associate director of dental health services at the Indiana State Board of Health, has been promoted to director of the ISBH dental division. He replaces Dr. Victor H. Mercer ('53), who retired last winter.

Dr. Smith has devoted most of his career to public health dentistry in Indiana. After earning a master's degree in public health from the University of Michigan in 1965, he joined the staff of Indiana's Department of Mental Health at the Fort Wayne State Hospital and Training Center. A year later he accepted a full-time appointment in the ISBH dental division, and was named associate director in 1985. For the past 23 years he also has served on the part-time faculty of the Indiana University School of Dentistry, first in the department of pediatric dentistry and now as associate professor of preventive and community dentistry.

As executive director of the Indiana Public Health Dentists organization, Dr. Smith supervises activities of about 40 public health dentists serving the needs of dental patients in the state's departments of mental health, correction, and special institutions. He is also consultant to the United States Public Health Service and chairman



Dr. Charles E. Smith

of the IDA Council on State Institutions.

Dr. Smith coordinated dental activities of the state's Head Start program for many years. For the past two decades he has been involved with grant-funded fluoridation projects aimed at children in Indiana schools. He has made numerous preventive dentistry presentations in communities and school systems throughout the state. A member of the IU dental school's Infection Control/Hazardous Materials Committee since 1985, he surveyed 2,000 Indiana dentists on use of barrier techniques, instrument sterilization, and their status in regard to the Hepatitis B vaccine.

Dr. H.R. Klein Elected to AAPD Office

Dr. H. Raymond Klein, a 1962 IUSD graduate who earned an IU certificate in pediatric dentistry in 1964, was elected secretary-treasurer of the American Academy of Pediatric Dentistry at the Academy's 43rd Annual Session in Boston in May.

"I hope to assist in achieving the successful continued recognition of our specialty by the ADA, provide quality continuing education for our members, and foster recruitment and retention of members," Dr. Klein said recently, expressing his objectives for the organization.

He is president-elect of the Florida Dental Association and of the College of Diplomates of the American Board of Pediatric Dentistry, and has been a delegate to the ADA House of Delegates since 1980. His service to the Academy includes a three-year term as a member of the Board of Trustees, during which he served as a member, and later as chairman, of the Budget and Finance Committee.

Dr. Klein is in full-time private practice in Jacksonville. He is a fellow of the American Academy of Pediatric Dentistry, the American College of Dentists and the International College of Dentists, and a Diplomate of the American Board of Pediatric Dentistry. He is also a recipient of the Florida Dental Association's Dentist of the Year Award.

1922

Dr. John M. Watt, South Bend, died February 25, 1990.

1923

Dr. Paul T. McClarnon, Brownsburg, died March 21, 1990. His wife, Betty, survives.

1926

Dr. Kenneth L. Flora, Crown Point, died March 26, 1990. He is survived by his wife, Adele.

1927

Dr. Delmar R. Faun, RR 1, Box 64A, Colfax, Indiana 46035, has kindly continued each year to send an updated address roster to all of the members of the Class of '27. So that his 1991 list is as complete as possible, Dr. Faun would be most grateful for any information pertaining to the following classmates that he has lost track of: Drs. Kem Brooks, Herbert Busch, Arthur Hellenberg, Karl Hudson, Albert Irion, Lloyd Taylor, and Alton Williams.

Dr. Brinley R. Lewis, Dover, Ohio, died October 20, 1989. His wife, Marian, survives.

1932

Dr. Harry M. Glass, 8728 Ridgeway Avenue, Skokie, Illinois 60076, has provided his yearly update of the Class of '32:

The news this past year has not been very good. The sudden and untimely death of our classmate, Lynn Vance, just prior to our planned class reunion, was very shocking. Our class reunion was not held at all. And along these lines, Ralph Kroot, who was visiting one of his children in the Glenview area near here, called and informed me that his wife, Pauline, had passed away in February. Ralph said that he was leaving for Las Vegas shortly to visit with a son who resides there.

I talked to Evan Steele, who is doing all right healthwise. He was going to visit with his son who lives near by in Shelbyville. Heard from Robert Durham of Sun City, Arizona, and he reports that everything is well with him and that he plans to attend the 60th Class Reunion in Bloomington. He would like to see all of us there. Wrote to Donald Lee and at this time have not received a response. Hope that everything is all right with him in Boca Raton, Florida.

Talked with Meredith Tom, who is fine. Meredith and wife, Helen, spent a part of last winter in Tucson, Arizona where they have a son who teaches at the university...

Talked with the old reliable Glen Lake and his wife, Margaret. Glen is still the ardent golfer and healthwise they are fine. The Lakes and Meredith Tom did attend the funeral of Lynn Vance. As for myself and wife, Iva, we are holding our own for old people and each day we hope will be a good one.

Of our graduating class, which numbered 35, there are seven known remaining: Robert Durham, Harry Glass, Don Lee, Ralph Kroot (Naples, Florida), Glen Lake (New Haven), Evan Steele (Franklin), and Meredith Tom (LaPorte).

Hope to have a better report next year.

Dr. S. Lynn Vance died last spring in South Bend, where he had practiced for 53 years. He had retired in 1987. Originally from Bristol, Tennessee, he had lived in South Bend since 1916.

Dr. Vance was a former president of South Bend Dental Society and the North Central Dental Society, president of Delta Sigma Delta Dental Fraternity, a volunteer at Healthwin Hospital and Northern Indiana Children's Dispensary. In 1989 he was named an Honor Dentist by North Central Dental Society. He was a member of Elks Lodge 235 and South Bend Shoe and Slipper Dance Club, and was a former member of the Odd Fellows. He was instrumental in the fluoridation of water in the South Bend area.

Dr. Vance married Verna M. Martin in 1936. She survives, along with a daughter, Patricia Ann Beaver of Farmington Hills, Michigan; two sons, Michael L. of Dowagiac, Michigan, and Gregory A. of Carmel; six grandchildren; and two great-grandchildren. A daughter, Doris Jeanne Thompson, died in 1979.

1934

Dr. Charles P. Kauffman, New Palestine, died March 12, 1990. He is survived by his wife, Norma.

1937

We have received a note from Mrs. Harold P. Haskins, 30 Oakdale Road, N.W., Fort Walton Beach, Florida 32548, who informs us that her husband died December 27, 1989. Dr. Haskins was in the U.S. Army Dental Corps for 30 years.

1939

Dr. Edward Young, LaPorte, was presented the Sagamore of the Wabash award. The award is approved by the governor of Indiana for Hoosiers who have provided exemplary service to their state and communities. Dr. Young practiced nearly 50 years before retiring. He has been long active in local, state, and national organizations. He served as president of the IUSD Alumni Association in 1970-71. The award was presented by State Senator Dennis Neary, D-8th; U.S. Representative John Hiler, R-3rd; and Edward Stigler, LaPorte County Republican Party chairman.

♦ ♦ ♦

Dr. David L. Francis, Marion, Virginia, died January 14, 1990.

♦ ♦ ♦

Dean H. William Gilmore reports that his brother-in-law, Dr. Wilber C. Boren, Jr., of Princeton, died June 11, 1990. He had practiced general dentistry for 40 years in Princeton and had been retired for the past 11. Dr. Boren was active during his career in both the dental profession and in his community. After graduating from dental school he was an intern at Robert Long Hospital, Indianapolis. Dr. Boren served in the U.S. Navy during World War II. He was a past president of the IUSD Alumni Association (1974-75). His memberships in dental organizations included the American College of Dentists and the International College of Dentists. Dr. Boren is survived by his wife, Margaret Rose; a son, Dr. Wilber C. Boren, III ('67), Elkhart; a daughter, Rebecca Lucille Handlon, Corydon; and five grandchildren.

1940

Dr. Samuel S Patterson, Indianapolis, received the Maynard K. Hine Award during the Indiana Dental Association's 132nd annual session last May.

Address: Dr. Lynn H. Rodenbarger, 1855 Washington Drive, Frankfort, IN 46041

Dr. Irving M. Sharon, Sherman Oaks, California, died June 22, 1989.

1943

Address: Dr. Jean W. Spear, 6626 W. Hamilton Road, Fort Wayne, IN 46804

1951

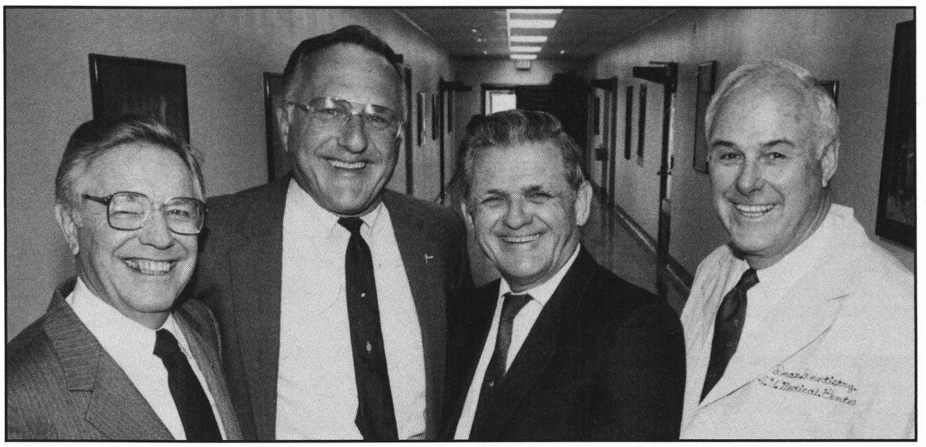
Address: Dr. Bruce C. Cook, 8338 Oakwood Avenue, Munster, IN 46321

1952

As a new member of the Ball State Board of Trustees, Pennie Thomas, wife of Dr. Harvey G. Thomas, Muncie, was the subject of an article appearing in the March issue of *Ball State Alumnus* magazine. (She graced the magazine's cover with new Board member Greg Schenkel and university president John E. Worthen.) Mrs. Thomas and Mr. Schenkel began four-year terms with the Ball State Board of Trustees last January.

1953

Dr. Wayne L. Heath, San Diego, California, died March 29, 1989.



Susan Crum

1954

International College of Dentists' officers visit IUSD. ***As vice president of the USA Section of the ICD, Dr. Lloyd J. Phillips (second from right) joined, from left, Dr. Eugene E. Brinker, ICD president (USA Section) and honorary IUSD alumnus, and Rear Admiral R. G. Shaffer, DC USN (Ret.), ICD secretary general, on a tour of the dental school facilities last May. With them is IUSD Dean H. William Gilmore. Dr. Phillips lives in Indianapolis, Dr. Brinker in Evansville, and Dr. Shaffer in Rockville, Maryland.***

1957

Dr. Don E. Lahrman, II, 1035 W. 9th Street, Erie, Pennsylvania 16502, has recently dropped a note to Carole Busch, of Associate Dean Bogan's office. He says he is currently working in a group practice in Erie. "*Although the hours are sometimes long, I enjoy it because I'm busy and practicing all phases of dentistry*," he says in part. "*Proud to be an IUSD graduate.*"

1958

Belated news has reached us that Dr. Blas L. Bou-Herrero, Corozal, Puerto Rico, died May 26, 1988. His wife, Elizabeth, survives.

1959

Address: Dr. David S. Eberly, 4567 Berklie Drive, Tallahassee, FL 32308

1960

Address: Dr. Peter R. Reibel, 421A University Park Court, Mishawaka, IN 46545

1965

Dr. Michael J. Ternisky, 6711 Whittier Avenue, McLean, Virginia 22101, was presented a silver Vicennial Medal by Georgetown University on April 21. The award is granted in recognition of 20 years of service by part-time members of the University faculty. Dr. Ternisky was an associate clinical professor in the department of pediatric dentistry.

1967

Dr. Gerry L. Kaufman, Fort Wayne, was elected president of the Indiana Dental Association during the IDA's annual session last May.

Addresses: Cheryl K. Clark (ASDH), Route 1, Box 3619, Ropesville, TX 79358; and

Dr. Wayne W. Herman, P.O. Box 5724, Columbia, SC 29250-5724

1969

We have received notice from Kay A. Pridgeon, P.O. Box 858, Anderson, Indiana 46015, that her husband, Dr. James L. Pridgeon, died April 4, 1989.

1970

Address: Dr. Stuart D. Fleitz, P.O. Box 171, Hamilton, NY 13346

1974

Dr. Keith W. Dickey was recently elected president-elect for Madison District Dental Society, a seven-county component of the Illinois State Dental Society and the American Dental Association. Besides his full-time appointment as associate professor of dentistry at Southern Illinois University, Dr. Dickey maintains a private dental practice in East Alton, Illinois.

Address: Jolene A. Edwards (AS-DLT), 3433 River Forest Drive, Fort Wayne, IN 46805

1975

Address: Herbert H. Edwards (AS-DLT)—see Jolene Edwards, Class of '74

1976

Address: Dr. John R. Stewart, 3700 Mishawaka Road, Suite #1, Elkhart, IN 46517

1978

Address: Dr. David L. Carr, 6919 Southstaff Road, Fayetteville, NC 28306

1979

Dr. Ronald L. Roszkowski has purchased the Indianapolis practice of Dr. Max Burke, who is now semi-retired. Dr. Roszkowski is in the process of selling his Carmel practice. His new dental office address is: Cedar Greene III, 7168 North Graham Road, Suite 160, Indianapolis, IN 46250.

1980

A short note from Dr. Kenneth H. Kahn, who tells us that he has successfully completed the certification examination given by the American Board of Endodontics and is now a Diplomate of the Board. "*I'm happily living and practicing in Boston,*" he reports. Dr. Kahn's address is One Washington Street, Wellesley, Massachusetts 02181.

1982

Dr. Diane M. Buyer, Indianapolis, has been named editor of the *Journal of the Indiana Dental Association.*

1984

Address: Dr. Paul Johnson, 13803 Oakwood Court, Carmel, IN 46032

1987

Congratulations are extended to Drs. Tom and Linda Sodano, Fort Wayne. They are the proud parents of Quentin Thomas Sodano, born June 13, 1990.

Addresses: Dr. Abdul Aziz Alawa (MSD), 16821 Northwest 81st Avenue, Hialeah, FL 33016; and

Dr. Sandra (Paraiso) Schwann, 211-12A Street N.W., Calgary, Alberta, Canada 72N 2H1

1988

Navy Lt. Lawrence E. Weaver, Portage, recently departed Camp Lejeune, North Carolina, on deployment to the Mediterranean Sea while serving with 22nd Marine Expeditionary Unit, Camp Lejeune. During the six-month deployment, Weaver and more than 1,700 sailors and Marines will participate in various military exercises involving numerous squadrons and Navy ships. He will also visit several foreign ports.

1989

Address: Dr. Matthew Steele Brennan, 1429 E. South Street, South Bend, IN 46615

Michigan Street Memos

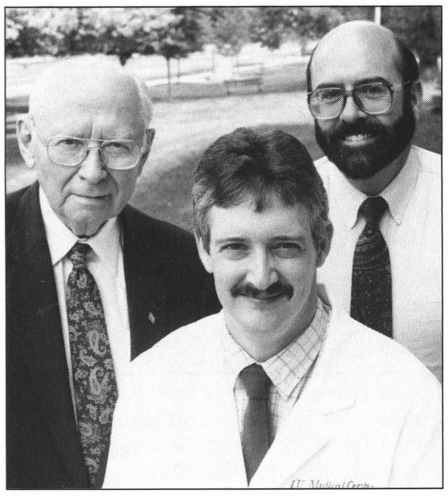
IU Student Among First Grads of NIDR's Dentist Scientist Program

Dr. Mark W. Beatty, a postdoctoral student at Indiana University School of Dentistry, is among the members of the first graduating class of the new Dentist Scientist Award program sponsored by the National Institute of Dental Research. The graduates visited the Institute in Bethesda, Maryland, in May to report on their experiences in the five-year program. Through the new program, the Institute supports students with dental degrees as they work toward their doctorates and gain specialized clinical and basic research experience.

During the visit graduates presented their research to dental scientists and were invited to take part in a meeting of the Institute's National Advisory Dental Research Council—the scientific body that makes final recommendations on NIDR grant awards and considers policy issues related to the support of dental research.

The Dentist Scientist program was initiated by NIDR director Dr. Harald Löe to increase the supply of clinical dental researchers for the future. In the early 1980s, administrators at NIH were concerned that the number of clinicians conducting research was declining. NIDR proposed the Dentist Scientist Award as a way to increase the supply of qualified investigators. Congress saw the need for it and soon approved funding.

"The Dentist Scientist Award is the premiere program for training future clinical dental researchers," Dr. Löe said recently. "By supporting doctoral training and research protocols for these dentists, we are ensuring that there will be enough dental scientists capable of moving from basic to clinical research in the 21st century."



Susan Crum

NIDR Dentist Scientist Mark W. Beatty (center) received the Dr. Maynard K. Hine Award for Excellence in Research during the May meeting of the Indiana Section of the American Association for Dental Research. The award, named for IUPUI Chancellor Emeritus Hine (left), is sponsored by the Procter and Gamble Company and is given annually in recognition of outstanding achievement in research by a postdoctoral student. Shown here with Drs. Hine and Beatty is Dr. James L. McDonald, Jr., president of the Indiana Section of the AADR.

The program is unique in biomedical research training because it does not require applicants to have significant clinical experience. It is designed specifically for those fresh out of dental school who would like to pursue a research career. A dentist may receive the award on an individual basis or through an institution. Each year, after keen competition, between 20-25 new candidates are chosen.

A 1981 graduate of the University of Iowa, Dr. Beatty has been an assistant scientist in the IU Department of Dental Materials for several years. His research has focused on experimental composite resins. Dr. Beatty is working toward graduate degrees in engineering, dental materials, and operative dentistry. The NIDR plans to follow Dr. Beatty's career and the careers of the other graduates for the next 10 years to see if the goal of increasing the number of dentists in research is being fulfilled.

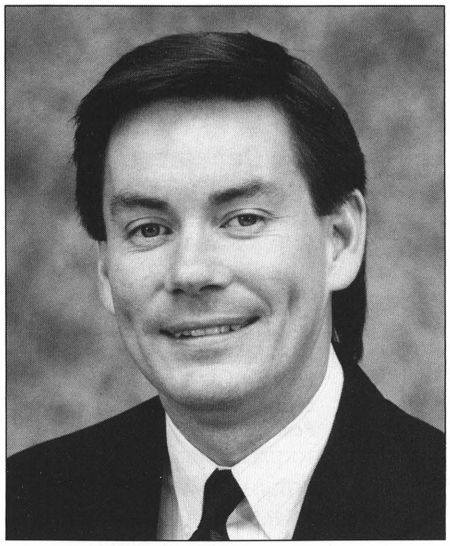
For information on the Dentist Scientist Award and application procedures, contact: Dr. Thomas Valega, Special Assistant for Manpower Development, Extramural Program, National Institute of Dental Research, National Institutes of Health, Westwood Building—Room 510, Bethesda, MD 20892 or call (301) 496-6324.

An IU-UWO Connection

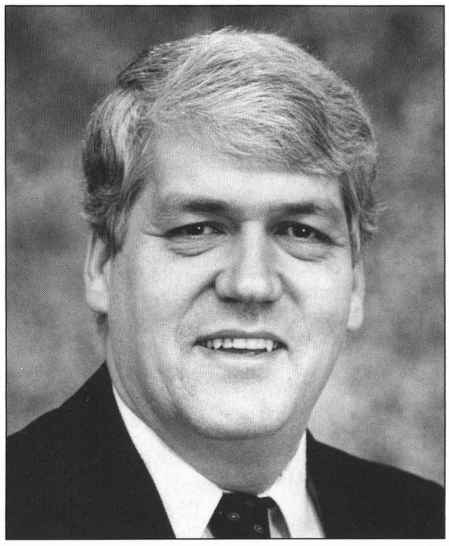
When officials at the University of Western Ontario, London, Canada, recently decided to showcase some of the university's alumni, they invited IU faculty member (and UWO graduate) Dr. Dale Miles to participate. He, in turn, took the opportunity to throw the spotlight on some of *our* alumni—IU graduates who have gone on to teaching positions at Western Ontario.

Dr. Miles, who has been an associate professor of dental diagnostic sciences at IU for two years, was one of seven speakers at Western University's Dental Alumni Day, held last June in recognition of the dental school's 25th anniversary. During the celebration Dr. Miles highlighted the strong connection between IU and UWO, citing a list of UWO faculty members who have received graduate training at IU. They include Dr. Walter R. Teteruck (MSD '63), prosthodontics; Dr. Robert H. Johnson (MSD '64), periodontics; Dr. David G. Gardner (MSD '65), oral diagnosis/oral medicine; and Drs. Bruce A. Wright (MS '78) and George Wysocki (post-doctoral fellow and former faculty member), oral pathology.

Dr. Miles also presented a talk entitled "Orofacial Pain—A Diagnostic Dilemma" during the continuing education portion of the program.



Danny R. Dean



James R. Levens

Dean, Levens Accept New Titles

Dean H. William Gilmore recently announced that Danny R. Dean, director of development, and James R. Levens, director of administrative and financial affairs, have each been given the additional title of Assistant Dean for the Indiana University School of Dentistry, effective immediately.

Mr. Levens has been employed in the business office of the dental school for 15 years (as senior business officer from 1975 to 1985). He first came to the campus in 1972, serving as assistant to the IUPUI controller. In addition to earning a bachelor's degree in business administration at IU, he completed training at IUPUI as a Certified Public Accountant in 1981.

Mr. Dean has headed development activities at the dental school for four years. Before his appointment at the dental school he served for several years as assistant director of the IUPUI Alumni Association. He holds bachelor's and master's degrees from Indiana State University. Mr. Dean currently is president of the Indiana Council for the Advancement and Support of Education.

Both Mr. Levens and Mr. Dean serve on the dental school's Executive Committee and Administrative Committee.

Susan Crum

Ada M. Miller

Ordering Up a Unique Retirement: Ada Says 'Good-bye'

"What I like is anything new. And—if it isn't immoral or illegal—it's nice to try it."

Ada M. Miller has every intention of living up to her philosophy.

For starters, she prepared for her retirement from the Indiana University Dental Order Office last May by boning up on medical terminology through IUPUI's continuing education program so that she could take *another* job—Ada now works three days a week as a ward secretary in the Intensive Care Unit at Riley Hospital. "My daughter Margo, who works in the Laboratory Animal Resource Center on campus, worries that I might get emotionally involved with patients in the ICU," Ada told us recently, "but I think I can handle it, and I want to try."

As if the Riley job isn't challenge enough, Ada also has been dabbling in a business that puts her physical stamina to the test. "I tried working for a catering company last Friday for the first time in my life," she says. "By the time I got home I just dropped into bed, too tired to eat. But I really liked it—I love anything with people contact."

For Ada, who has spent a lifetime on the go, the toughest part of facing retirement is learning how to sit down and *relax*. "Drastic changes in your life can be scary," she says. "And retirement is a drastic change. Still, it's very challenging. At the dental school, I got used to working long weeks with lots of overtime. If I find myself with an extra minute, I'm the type who has to do something to fill it."

Ada was born in Philadelphia and raised in Indianapolis. Before joining the dental school staff 12 years ago, she was employed for three-and-a-half years in the pharmacy at University Hospital and for eight in the billing department at Methodist Hospital. In addition to her daughter Margo, Ada has three other children (Johnny and Alban, both of Indianapolis, and Elizabeth Larson, of West Liberty, Iowa) and four grandchildren.

On the home front, Ada has bypassed her easy chair to plant a garden and tend to home repairs this summer. She is, as always, a "regular" at Grindstone Charlie's, where her favorite country/folk singer, Bill Wilson, entertains. Ada also enjoys performances at Fountainsquare's Theatre on the Square. She will travel with her sister in October to attend a hot-air balloon festival in Albuquerque, New Mexico.

Ada's dental school friends and associate's recently honored her with a monetary gift and a luncheon at the Chancellor's restaurant on campus. "The dental school has some terrific people in it," says Ada. "I plan on keeping in touch."

IU School of Dentistry

CONTINUING EDUCATION CALENDAR

(all courses held in Indianapolis unless otherwise stated)

October 2

CE-81 Advanced Endodontic Series for Dentists
Differential Diagnosis of Periapical Pathology
Dr. Lawrence I. Goldblatt, IU dept. of oral pathology

October 3

CE-84 Productivity by Design—The Ultimate Scheduling Seminar for Dentists, Spouses and Auxiliaries
Jennifer M. de St. Georges, management consultant and chairman of the board of Jennifer de St. Georges & Associates, Inc., Monte Sereno, California

October 3

CE-79 Advanced Periodontic Series for Dentists
Comprehensive Treatment Planning for the Periodontal Patient
Dr. E. Brady Hancock, IU chairman of periodontics

October 6-8

CE-85 AGD Hoosier Concept '90s and Beyond: Fixed Prosthodontics
IU faculty members, dept. of prosthodontics: Dr. Charles J. Goodacre, chairman; and Drs. Philip C. Rake, Carl J. Andres, Donald R. Schmitt and Steven P. Haug

October 9

CE-81 Advanced Endodontic Series for Dentists
Preparation of Root Canal Space
Dr. Carl W. Newton

October 9, 10

CE-86 Implants: The Science, Surgery and Prosthetic Demands for Dentists
Phase I: An Overview of Dental Implantology
Dr. Eugene Roberts, Indianapolis; Dr. Jack E. Lemons, chairman of biomaterials, University of Alabama School of Dentistry; and Dr. Jack A. Hahn, private practitioner and co-director, Midwest Implant Institute, Cincinnati, Ohio

October 16

CE-81 Advanced Endodontic Series for Dentists
Obturation of Root Canal Space
Dr. Carl W. Newton

October 17, 20

CE-87 Dental Radiology Lecture and Laboratory for Auxiliaries
Dr. Thomas F. Razmus and Prof. Gail F. Williamson, IU dept. of dental diagnostic sciences

October 20

CE-88 CPR, Basic Life Support for Dentists and Auxiliaries
Roberta M. Hilderbrand, IU dept. of preventive and community dentistry

October 24-26

CE-86 Phase IIa: Evaluation, Interpretation and Selection of Implant Systems
Dr. Charles Weiss, founder and past president of International Congress of Implantology, New York; Dr. Mats Henningson, Nobelpharma USA, Inc.; Dr. Charles L. Nelson, IU dept. of oral and maxillofacial surgery; Dr. David T. Brown, IU dept. of prosthodontics; Dr. Paul J. Mentag, private practitioner in dental implantology and faculty member, University of Detroit; and Larry Sowinski, CDT, Zionsville, Indiana

October 26

CE-89 IUSD Practice Management Personal Finance Study Club
Stephen E. Plopper, senior partner, Klineman, Rose, Wolf and Wallack, of Indianapolis

October 30

CE-81 Advanced Endodontic Series for Dentists
Restoration of Endodontically Treated Teeth
Dr. Michael A. Cochran, IU chairman of operative dentistry

November 3

CE-90 Indiana Dental Association-Indiana University School of Dentistry Academy of Continuing Education—Fall 1990 Program:
Excellence in Esthetics—Today's Primary Practice
Dr. Robert Nixon, cosmetic and restorative dentistry, Los Angeles, California
Course held in Merrillville, Indiana

November 7

CE-91 Viral Hepatitis...Couldn't Happen in My Office
Dr. Jack E. Schaaf, director, IUSD special patient care services; and IUSD dept. of oral microbiology faculty members Dr. Chris H. Miller (chairman) and Charles J. Palenik

November 14,15

CE-86 Phase IIb: Evaluation, Interpretation and Selection of Implant Systems (dental assistants invited)
Dr. Thomas Golec, oral and maxillofacial surgeon, San Diego, California; Dr. Charles L. Nelson; and Peter J. Murphy, advanced oral technology division, Ito & Koby Dental Studio

November 16, 17

CE-92 Symposium on Esthetics and Dental Imaging
Dental Imaging *(first day), presented by Dr. Cary E. Goldstein, private practitioner in Atlanta, Georgia and special lecturer in esthetic dentistry at Emory University; and* ***Dental Office Imaging Systems*** *(second day), presented by Dr. Robert L. Lockhart, IU dept. of periodontics*

November 20

CE-81 Advanced Endodontic Series for Dentists
Management of Traumatized Teeth
Dr. Kenneth J. Spolnik, IU dept. of endodontics

November 27

CE-81 Advanced Endodontic Series for Dentists
Evaluation of Success and Failure, Retreatment
Dr. Carl W. Newton

November 28

CE-79 Advanced Periodontic Series for Dentists
Re-evaluation After Initial Therapy
Dr. E. Brady Hancock

November 30, December 1

CE-93 Calcitek Inc. Training Program and Workshop Series:
Comprehensive Review of Biointegrated Implant Prosthodontics
Dr. Gerard Chiche, dept. of fixed prosthodontics, Louisiana State University; Dr. Burton Melton, prosthodontist, Albuquerque and Santa Fe, New Mexico; Dr. Ed McGlumphy, dept. of restorative and prosthetic dentistry, The Ohio State University; and Alan H. Cushman, president of Medesco Attachment Company, Huntington Beach, California

December 8

CE-94 Electronic Dental Anesthesia
Dr. Fred Quarnstrom, private practitioner, Seattle, Washington

December 13,14

CE-95 Clinical Molar Workshop for Dentists
Dr. Carl W. Newton

January 18, 1991

CE-96 IUSD Practice Management Personal Finance Study Club
Lawrence A. Jegen, III, Thomas F. Sheehan Professor of Tax Law and Policy, IU School of Law

January 16,19

CE-97 Dental Radiology Lecture and Laboratory for Auxiliaries
Dr. Thomas F. Razmus and Prof. Gail F. Williamson

January 26

CE-98 Dentistry's New Age of Competition
Dr. Kenneth James, private practitioner, Seattle, Washington

February 7-9

PGA Sheraton Resort Golf and Tennis Club
Palm Beach Gardens, Florida
Restoration of Debilitated Dentition *(first 2 days), presented by Dr. Kenneth A. Turner, dept. of prosthodontics, Emory University; and* **Operative and Esthetic Dentistry** *(3rd day), presented by Dr. Donald Antonson, chairman of operative dentistry, University of Florida*

March 8,9

Nitrous Oxide Lecture and Laboratory Workshop
Dr. Wilfrid M. Keaton, IU dept. of oral and maxillofacial surgery

March 15,16

Pain Control Clinic
Dr. Parker Mahan, Facial Pain Center, University of Florida

For more information about courses and registration, write to Dr. Donald E. Arens, Director of Dental Continuing Education, 1121 West Michigan Street, Indianapolis, IN 46202; or call Ms. Sandy Manion (317)274-7782.

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