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DENTAL TRIBUNE

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DENTAL PHENOMICS: TWIN DIFFERENCES

Twins and 3-D imaging help reveal genetic, environmental and epigenetic factors influencing dental features and oral health.

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TREATING SEVERELY MENTALLY ILL PATIENTS

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'Bioteeth' a step closer to becoming clinical reality

Scientists 'build' teeth that have dentine, enamel, viable roots

Researchers at the Dental Institute at King's College London say they're a step closer to growing human teeth in the lab using cells from the individual who would ultimately receive the tooth as a natural implant.

Led by Professor Paul Sharpe, the research team isolated adult human gingival tissue from dental patients at the institute, grew more of the tissue in the lab, and then combined the tissue with mesenchyme (tooth-forming) cells from mice. The combination of cells were transplanted into mice renal tissue, where they grew into hybrid human/mouse teeth that contained dentine and enamel — and formed viable roots.

The root formation is seen as a key breakthrough, because bioengineered teeth with natural root structure could eliminate one of the challenges sometimes seen with tooth-implant technology to date: a risk of bone loss in the area of the jaw that anchors an artificial implant. Such bone loss has been attributed to friction that occurs when eating or because of other jaw movement.

▸ See BIOTEETH, page A2

Nonmembers can sample CDA Presents

Discounts available to access California Dental Association event

Nonmembers can experience one of the biggest benefits of California Dental Association membership by attending CDA Presents in Anaheim for $75.

Nonmembers who take advantage of the offer save $815 and gain access to world-class speakers, numerous C.E. opportunities and an extensive trade show.

Registration materials must be picked up on site at a membership presentation held in the registration area. Those who already took advantage of this promotion or who had a CDA membership in 2011 or 2012 are not eligible. Additionally, if a nonmember isn't able to attend one of the membership presentations, registration cost is $890.

Details on the April 11–13 event can be found at *www.cdapresents.com*.

Nonmembers also have the opportunity to register for a $175 one-day pass for exclusive Saturday, April 13, entry to the trade show floor featuring products and services from close to 600 companies.

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Seattle is the site of the American Academy of Cosmetic Dentistry Scientific Session, April 24–27. Included with tuition fees is access to the welcome reception at the Experience Music Project, located near the base of the Seattle Space Needle. Photo/By Jake McGuire provided by Destination DC

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Dental clues assist in effort to identify USS Monitor remains

The remains of two sailors discovered during the 2002 recovery of the gun turret of the Civil War-era ironclad ship USS Monitor were interred at Arlington National Cemetery March 8. At the time of the interment ceremony the sailors remained unidentified, but thanks in part to dental clues, researchers are closer to possibly identifying the two men by name, and perhaps ultimately even identifying them in photographs from the era.

The remains of the two sailors are the only remains to be discovered of 16 sailors lost when the Monitor sank during a storm on Dec. 31, 1862, off Cape Hatteras, N.C. The Joint POW/MIA Accounting Command (JPAC), Joint Base Pearl Harbor-Hickam, conducted forensic analysis on the remains in an effort to identify the two sailors who lost their lives more than 150 years.

JPAC staff members who took part in the identification process included a dentist who analyzed the teeth from the remains, with the intent to cross reference them with any dental records that they might be able to find. To date, no such records have emerged, but the sailors' teeth have revealed other clues that brought JPAC staff members closer to their goal of identifying the sailors by name.

Forensic anthropologist Robert Mann, director of the Forensic Science Academy for JPAC, was assigned to do the skeletal analysis. "The Monitor sailors were really very unusual for us; water recoveries first of all are not that common for us," said Mann. "To recover remains from the bottom of the ocean that sat there for 150 years is really phenomenal.

"There are a lot of challenges when you are trying to identify someone, especially when you're just dealing with skeletal remains. If you think about how you recognize somebody, and how we identify people, they identify them by visual examinations," said Mann. "Look at the face or finger prints, well we don't have finger prints after 150 years. We don't have faces, we have bones and teeth."

Medical-grade models show exact replicas of the remains of the two sailors recovered from the Civil War-era ironclad USS Monitor and archived at Joint POW/MIA Accounting Command. The unknown sailors and 14 shipmates were lost when the Monitor sank off Cape Hatteras, N.C., on Dec. 31, 1862. Dental analysis is being used to attempt to identify the sailors. U.S. Navy photo/Mass Communication Specialist 2nd Class Jon Dasbach

One of the challenges faced was the amount of available records from the Civil War-era and when the Monitor sank in 1862.

"We're talking 150 years and from the Civil War. The records are not that good and we don't have the dental x-rays. We don't have DNA samples from everybody missing and family members missing, we don't have all 16 individuals who are missing, this really is a difficult job," explained Mann.

Due to the conditions and elements the remains were exposed to during the last 150 years, Mann and other JPAC staff members were faced with more challenges in their attempts to identify the two sailors.

The first major step in identifying the remains was a desalination process, which removed the salt from the bones. The remains were also covered in rust, coal and sediments from the ocean, all of which have to be removed before the identification process can begin. This process alone lasted several months.

Once the bones were cleaned, Mann was able to examine the remains and establish biological profiles of the two sailors.

"From the bones and teeth, we examine them visually. I can tell the individuals age, their race, their sex, how tall they were, any kind of injuries they may have had during their life time, their oral health and any kind of distinguishing features they may have," said Mann. "Those are the things that can help us identify them."

▸ See MONITOR, page A3

◂ BIOTEETH, page A1

The goal is creation of a viable root that would be integrated into the jaw as if it was the recipient's natural tooth. There's no need for the crown of the tooth to match the bite, because technology exists to create a man-made alternative that integrates appropriately into the bite and appearance — and functions comparably to a natural crown.

The King's College London Dental Institute reports that previous efforts to produce bioengineered teeth (bioteeth) have focused primarily on the generation of immature teeth (teeth primordia) that mimic those in the embryo. Such teeth could be transplanted as small cell "pellets" into the adult jaw to develop into functional teeth. It has been demonstrated that embryonic teeth primordia can develop normally in the adult mouth, so if suitable cells can be identified and combined in such a way to produce an immature tooth, there is a realistic prospect that bioteeth can become a clinical reality.

Subsequent studies have largely focused on the use of embryonic cells; and although it is clear that embryonic tooth primordia cells can readily form immature teeth following dissociation into single cell populations and subsequent recombination, such cell sources are considered impractical to use in a general therapy.

Sharpe, an expert in craniofacial development and stem cell biology, said, "What is required is the identification of adult sources of human epithelial and mesenchymal cells that can be obtained in sufficient numbers to make biotooth formation a viable alternative to dental implants. ... Epithelial cells derived from adult human gum tissue are capable of responding to tooth-inducing signals from embryonic tooth mesenchyme in an appropriate way to contribute to tooth crown and root formation and give rise to relevant differentiated cell types, following in vitro culture. These easily accessible epithelial cells are thus considered a realistic source for consideration in human biotooth formation. The next major challenge is to identify a way to culture adult human mesenchymal cells to be tooth-inducing, as at the moment we can only make embryonic mesenchymal cells do this."

Sharpe's findings were published in the Journal of Dental Research. The team's efforts were funded by the National Institute for Health Research (NIHR) Biomedical Research Centre at Guy's and St. Thomas' NHS Foundation Trust and King's College London, United Kingdom. The research report became available online in early March at *jdr.sagepub.com*. Categorized under "Research Reports – Biological," the article is titled, "Adult Human Gingival Epithelial Cells as a Source for Whole-tooth Bioengineering."

(Source: Dental Institute at King's College London)

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PUBLISHER & CHAIRMAN
Torsten Oemus *t.oemus@dental-tribune.com*

CHIEF OPERATING OFFICER
Eric Seid *e.seid@dental-tribune.com*

GROUP EDITOR
Robin Goodman *r.goodman@dental-tribune.com*

EDITOR IN CHIEF DENTAL TRIBUNE
Dr. David L. Hoexter *feedback@dental-tribune.com*

MANAGING EDITOR U.S. AND CANADA EDITIONS
Robert Selleck *r.selleck@dental-tribune.com*

MANAGING EDITOR
Fred Michmershuizen
f.michmershuizen@dental-tribune.com

MANAGING EDITOR
Sierra Rendon *s.rendon@dental-tribune.com*

MANAGING EDITOR SHOW DAILIES
Kristine Colker *k.colker@dental-tribune.com*

PRODUCT/ACCOUNT MANAGER
Mara Zimmerman
m.zimmerman@dental-tribune.com

PRODUCT/ACCOUNT MANAGER
Charles Serra *c.serra@dental-tribune.com*

MARKETING DIRECTOR
Anna Kataoka-Wlodarczyk
a.wlodarczyk@dental-tribune.com

EDUCATION DIRECTOR
Christiane Ferret *c.ferret@dtstudyclub.com*

ACCOUNTING COORDINATOR
Nirmala Singh *n.singh@dental-tribune.com*

Tribune America, LLC
116 West 23rd St., Ste. #500
New York, N.Y. 10011
(212) 244-7181

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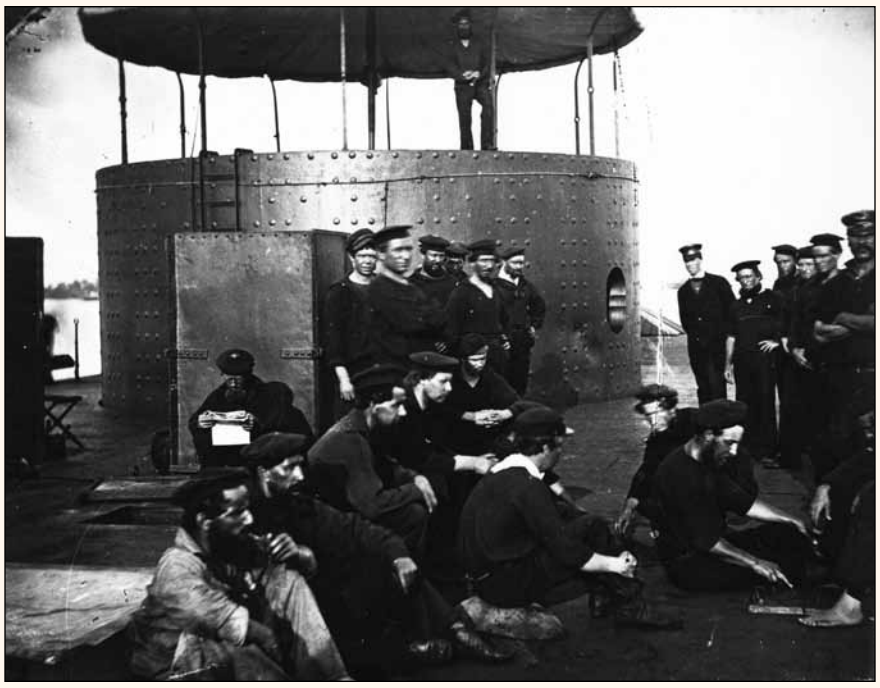
◂ MONITOR, page A2



The USS Monitor crew at ease outside the turret. The Brooklyn-built Monitor, designed and built in a record 118 days, was commissioned Feb. 25, 1862. It fought the CSS Virginia on March 9, 1862, in the first battle between two ironclads. Photo/Provided by U.S. Naval History and Heritage Command

Illustration by Norm Cubberly showing what possibly happened to the Monitor after she slipped beneath the waves on Dec. 31, 1862. Illustration/Provided by the National Oceanic & Atmospheric Administration

The biological profiles, revealed primarily through studying the development of the teeth concluded that the sailors were both white males, one 17 to 24 years old and the other in his 30s. Both sailors stood about 5-feet-7-inches tall.

Speaking in more detail about the teeth of the older sailor, Mann said researchers found "a round spot" worn into the sailor's bite. "It's a little semi-circle in the top [teeth] and a semi-circle in the bottom, and you put that together and what would that be? That's a pipe-stem groove. Back in the Civil War a lot of sailors were smoking clay pipes that were very abrasive. So they would put this clay pipe between their teeth and sit there and grind on it; and after a while it acts like sandpaper and puts a groove there in their top teeth and their bottom teeth. ... We have evidence in his teeth: There's no doubt about it, this individual smoked a pipe."

Mann created a short list of possible identities based off of the age, race and height of the sailor's remains, and narrowed down the identities to six possibilities by comparing them to the 14 other sailors. Because of a limited number of records and lack of dental records from the Monitor, the next step in attempting to identify the fallen sailors is DNA testing. Genealogists have been able to identify possible descendants for 10 of the 16 missing sailors.

"What we're going to hope for is we may still find [descendants] of the other missing sailors," said Mann. "If that happens we can get DNA samples from them, then we may be able to exclude the other 15 sailors, we may end up with a match. We may end up with one or both of these sailors [identities]."

Secretary of the Navy Ray Mabus announced Feb. 12 that the remains recovered from the Monitor were to be interred in Arlington National Cemetery on March 8. The date was chosen to honor Monitor's role in the Battle of Hampton Roads 151 years ago. "The importance of recovering a fallen warrior is to let the nation know that the United States has made a commitment that once we've put someone it harm's way, and they are either missing or killed in action, that we have a resolve to go back and return them back to their families," said McKay.

McKay also expressed the importance of JPAC's role to future service members, and their families and to those who are currently serving today. "It gives the family closure, and I think it gives the war fighter a sense of comfort to know that no matter what happens, the nation has not forgotten them and will return them back home with honor," said McKay. All 16 sailors will be memorialized on a group marker in section 46 of Arlington National Cemetery, which is between the amphitheater and the USS Maine Mast memorial.

(Source: Navy Public Affairs Support Element)

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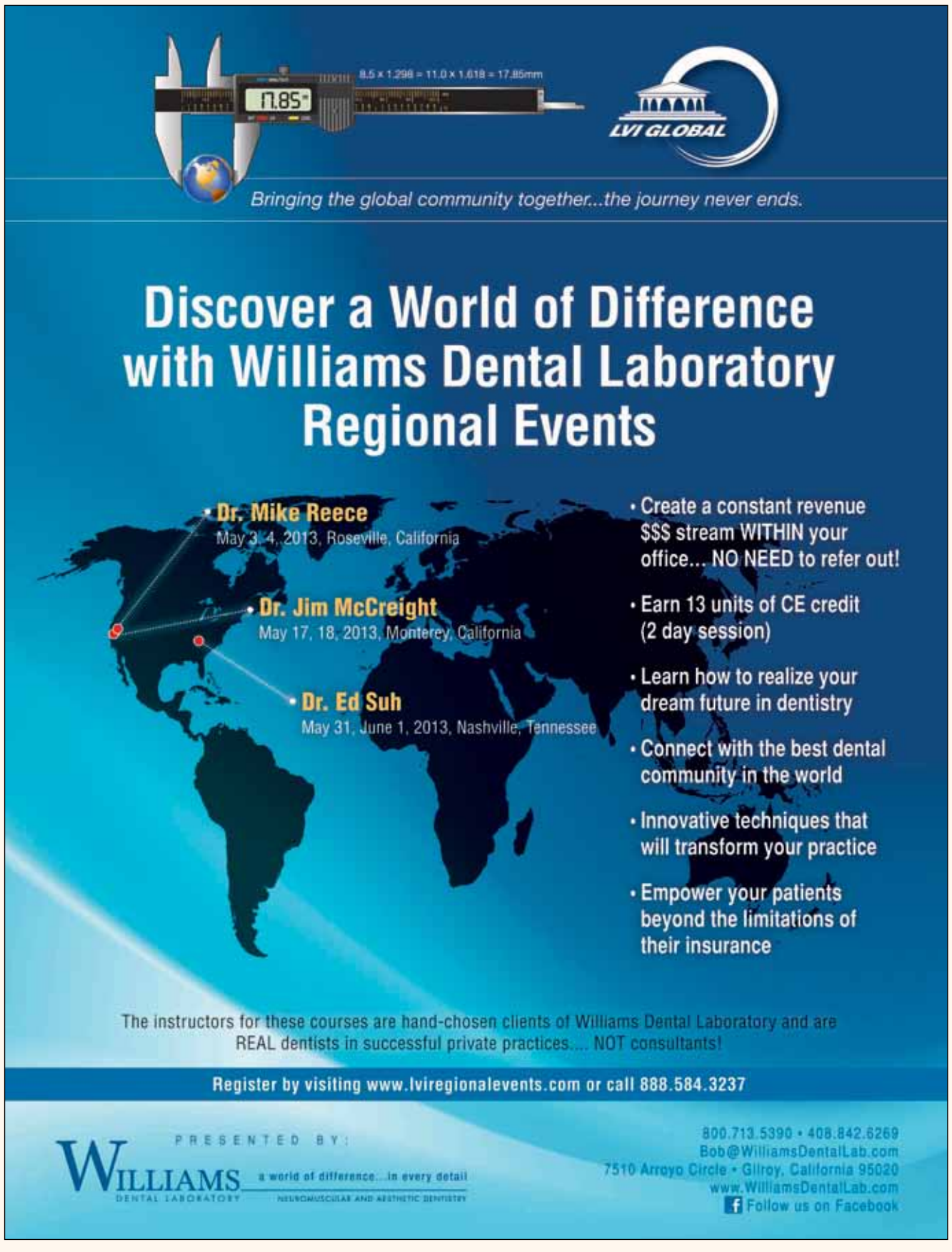


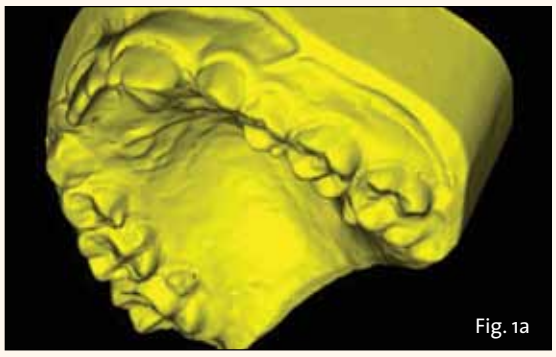


Fig. 1a: Image of 3-D laser scanned upper study model of MZ co-twin A.
Photos/Provided by The University of Adelaide

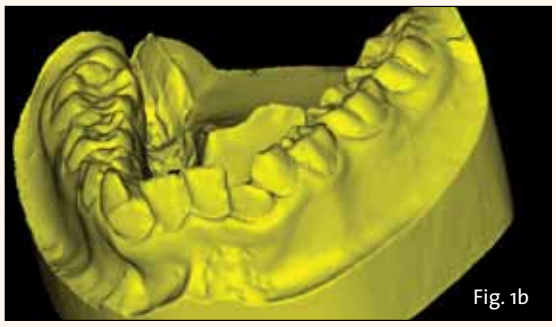


Fig. 1b: Image of 3-D laser scanned lower study model of MZ co-twin A.

Dental phenomics: High-tech scans reveal similarities and differences in monozygotic twins

AD

By Suzanna Mihailidis, Atika Ashar, Toby Hughes, Michelle Bockmann, Alan Brook and Grant Townsend

Dental phenomics

While it was once assumed that genetic and environmental contributions to observed variation in many human physical and behavioral features were independent of each other, advances in the field of epigenetics have confirmed the dynamic nature of the interactions between the genome and the environment, which result in phenotypic variation.

Epigenetics can be defined broadly as any alteration in gene expression without changes in nucleotide sequencing.[1] On this basis, the development of the dentition can be viewed as comprising a series of spatial and temporal interactions between epithelial and ectomesenchymal tissues, where minor perturbations in the process of odontogenesis may have significant effects on final phenotypic expression.[2]

Describing dental phenotypes in greater detail (compared with traditional methods), together with application of modern approaches to large-scale genome scanning,[3] now provides an opportunity to explore genetic, epigenetic and environmental influences on the human dentition in more detail than has been possible previously. This has led to a new era of dental phenomics,[2] which involves either intensive (detailed descriptions of multiple features on a single tooth) or extensive (detailed descriptions of multiple features across multiple teeth) phenotyping of the dentition.[4]

The development of new equipment for measuring teeth in two dimensions (2-D) and three dimensions (3-D), including laser scanners, has facilitated the development of dental phenomics.

Recent studies have shown both 2-D and 3-D techniques display high levels of reliability, precision and accuracy,[5,6] opening up a range of exciting possibilities for dental researchers to define new, and more biologically meaningful, phenotypes.

Figure 1 shows an example of 3-D imaging of the dental models of a pair of monozygotic (MZ) twins, demonstrating the high degree of detail and depth

of dental features possible using 3-D laser technology.

The value of twin studies in dental phenomics

Our studies of Australian twins commenced in the School of Dentistry at the University of Adelaide in the early 1980s, and currently there are records of more than 1,200 pairs of twins across three main cohorts of participants.

The first cohort consists of around 300 pairs of teenage twins, for whom various records have been collected, including dental casts, facial photographs, finger and palm prints and information on laterality, including handedness.

The second cohort comprises around 300 pairs of twins who have been examined at three stages of dental development from approximately 4 to 14 years: at primary, mixed and permanent dentition stages.

The most recent study of tooth emergence and oral health provides a third cohort of around 600 twin pairs, aged from birth to around 5 to 6 years.

Our broad aim in these studies has been to improve our understanding of how genetic, environmental and epigenetic factors contribute to variation in dental and facial features, and to oral health.[7]

Findings from our studies showing dental discordance between MZ co-twins in relation to tooth size, missing teeth, extra teeth and asymmetrical expression, not only highlight the importance of epigenetic influences on human dental development but are consistent with the concept that there is a group of genes that not only influence the size and shape of teeth but also the expression of missing or extra teeth, i.e., there are pleiotropic genetic effects operating on the human dentition, as well as spatial and/or temporal variations in local epigenetic events during odontogenesis, that lead to distinct phenotypic differences in the dentition, even in genetically identical twin pairs.[1]

While the twin pair described in this article illustrates the value of identifying differences in MZ co-twins as well as their similarities (i.e., the MZ co-twin model), there are other twin models available to researchers. These include the traditional or classical twin model (comparisons between MZ twin pairs and dizygotic (DZ) twin pairs, which enable heritability estimates to be calculated); the twins-reared-apart model; the investigation of twins and other family members; the MZ half-sibling model; and the DZ opposite sex model.[8]

Case study: MZ co-twins showing similarities, dissimilarities and asymmetry in the expression of various dental features

We have found many examples of MZ twin pairs who exhibit varying degrees of similarity and dissimilarity in the expression of various dental features.

This particular case study describes a pair of female MZ co-twins selected from the second cohort for whom facial photographs, and study models of the primary and mixed dentition are available. Zygosity was determined by analysis of up to six highly variable genetic loci (FES, vWA31, F13A1, THO1, D21S11, FGA) on six different chromosomes, using DNA obtained from buccal cells.

This particular MZ co-twin pair has been selected to highlight how similarities, dissimilarities and asymmetry of dental features may all occur in a pair of genetically identical twins.

Similarities in the expression of Carabelli trait

Carabelli trait is evident on the lingual aspect of the mesio-lingual cusp for all primary maxillary second molars and permanent maxillary first molars (Figure 2) for both Twin A and Twin B (arrowed). Qualitative comparison of the size and position of the feature suggests a high degree of similarity in the expression of the trait for both dentitions (primary and permanent), whether making intra-twin and/or inter-twin comparisons.

Dissimilarities in the expression of fused primary teeth

Study models of the lower primary dentition for Twins A and B are shown in Figure 3. Twin B exhibits fused lateral incisor and canine teeth, bilaterally (arrowed), while Twin A does not exhibit any fused teeth. The assumption that the teeth are fused (in contrast to being geminated) is based on the fact that there is one less tooth than expected in each quadrant.

Asymmetry (and mirror-imaging) in the expression of retained primary maxillary lateral incisor teeth

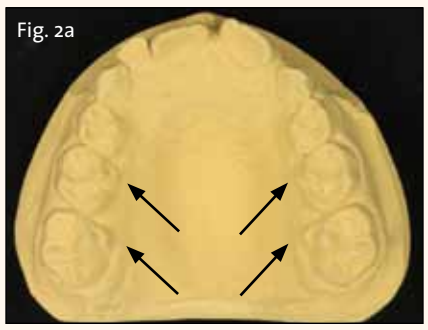
One particularly interesting expression of asymmetry that can be observed in MZ twin pairs is the phenomenon of mirror imaging, where one twin mirrors the other for one or more features. An example of mirror imaging is shown in Figure 4, which presents a frontal view of the upper primary dentition of Twins A and B.

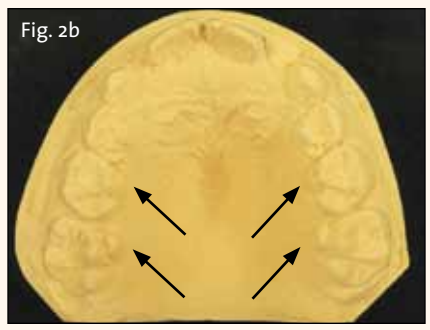
The upper left lateral incisor of Twin B is worn and retained (with the upper right lateral incisor of Twin B missing), while Twin A exhibits a mirror image of this, i.e., the upper right lateral incisor is worn and retained (with the upper left lateral incisor missing) (arrowed).

There is evidence to suggest that many of these dental features discussed may be inter-related, for example, Carabelli trait and the size of teeth,[9] and anomalies of number, size and shape of teeth.[10,11]

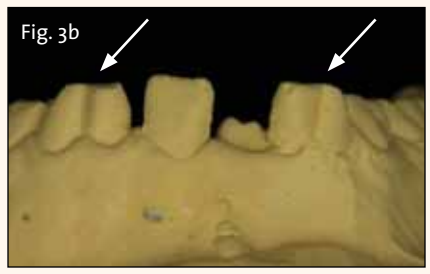
This case study highlights how MZ co-twins provide an extremely valuable research model, for example, just one pair of MZ co-twins displaying similarities, dissimilarities and asymmetry in their dentitions offers great opportunity to understand more deeply the underlying biological processes of tooth formation.

Use of high-precision 2-D and 3-D imaging equipment will not only enable us to quantify and describe dental variations, such as Carabelli trait, in more detail than has been possible previously, but to also define new phenotypes that we have not been able to measure previously, including small grooves and tubercles, as well as crown contours, areas and volumes.

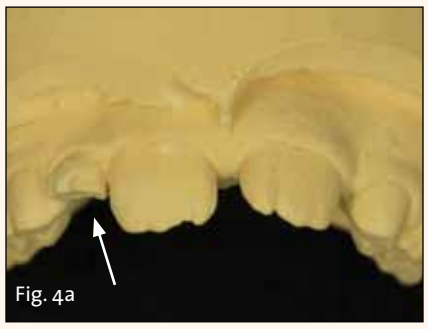


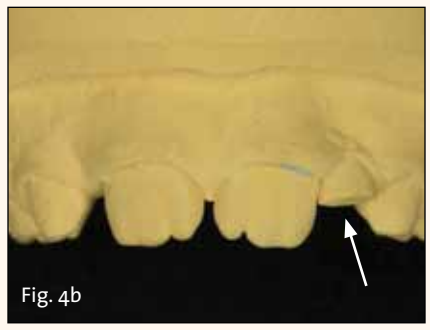


Figs. 2a, 2b: Photo image of upper primary study models for MZ co-twins A [Fig. 2a] and B [Fig. 2b] showing Carabelli trait (occlusal view).



Figs. 3a, 3b: Photo image of lower study models for MZ co-twins A [Fig 3a] and B [Fig 3b] showing frontal view of fused primary lateral incisor and canine teeth in co-twin B.





Figs. 4a, 4b: Photo image of upper study models for MZ co-twins A [Fig. 4a] and B [Fig 4b] showing frontal view of asymmetrically retained primary lateral incisor teeth.

How can dental phenomics enhance future understanding of biological processes related to dental development?

We plan to maximize the use of the longitudinal data and DNA we have collected, and continue to collect, by performing genome-wide scans for putative genetic linkage peaks for a range of dental features, and then to test for association between a series of likely candidate genes and our phenotypes.

Identifying the key genes for dental development in humans would not only provide clinicians with a sounder scientific basis for monitoring individuals predisposed to developmental problems (e.g., missing teeth, malocclusions) but assist when counselling patients, especially where there is a familial history.

By developing the field of dental phenomics we hope to better understand how genetic, environmental and epigenetic factors interact to produce the extensive range of variation observed in the human dentition.

Authors' contact information

Suzanna Mihailidis, BDS, BEc, PhD
Craniofacial Biology Research Group
Lecturer, School of Dentistry
The University of Adelaide,
South Australia 5005, Australia
suzanna.mihailidis@adelaide.edu.au

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Pediatric specialists gathering in Orlando

American Academy of Pediatric Dentistry Annual Scientific Session packed with networking opportunities, May 23–26

Orlando's vibrant nightlife awaits attendees of the American Academy of Pediatric Dentistry Annual Scientific Session. Photo/Provided VISIT FLORIDA

The American Academy of Pediatric Dentistry (AAPD) 66th Annual Session will be held May 23–26 in Orlando, Fla. Anyone (member or non-member dentist, dentists' staff or dental student) who wants to attend any portion of the scientific program must register.

All registration categories include all education sessions (except those specified), the welcome reception, complimentary beverages in exhibit hall and the scientific proceedings. The guest registration is additional and must accompany that of an attendee; children are complimentary to the meeting, but tickets must be purchased for social events. Guests do not earn any continuing education credit; if seeking a C.E. certificate, spouses/guests must register as office staff. Cutoff for an advance-registration discount is Monday, April 8.

Keynote: Chef Marcus Samuelsson

The keynote speaker is Marcus Samuelsson, an internationally acclaimed chef, philanthropist, and a New York Times best-selling author. Samuelsson is the youngest chef to ever achieve two three-star reviews from The New York Times and he has been honored by the James Beard Foundation on multiple occasions including Rising Star Chef (1999), Best Chef: New York City (2003), Best International Cookbook (2007) and Best Television Program (for Chopped 2012). The author of several award-winning cookbooks, Samuelsson released his best-selling memoir, "Yes, Chef," in June 2012.

Networking and fun

Social events include the welcome reception at Disney's Hollywood Studios, a theme park with a motion-picture theme covering the Golden Age of the Silver Screen through to the Disney-Pixar partnership. Attractions, shows, shops and restaurants are exclusively available to AAPD members for the evening. Other networking events include a 5K run/walk at Epcot Center, a career opportunities fair, new pediatric dentist happy hour, international reception and the president's farewell dinner at the Walt Disney World Dolphin Hotel.

Also available are a number of tours and theme-park packages, including: Airboats and Alligators, Kennedy Space Center, Disney's Animal Kingdom Behind-The-Scenes, SeaWorld Private Tour, Universal Studios and Islands of Adventure, Disney's Magic Kingdom Backstage — as well as other special Disney theme park prices and hours.

Online itinerary planner

Access the online itinerary planner at *www.aapd.org/annual/annual_2013* to view the complete scientific program with course descriptions, speaker bios and more. You can search by session type, day or keywords. You also can create an account to save your preferred sessions and exhibitors. See the current exhibitors online on the "Exhibitors" pages, and plan out who to visit to examine supplies hands-on before purchase. Search exhibitors by category or company.

About the AAPD

Founded in 1947, the AAPD is a not-for-profit professional membership association representing the specialty of pediatric dentistry. Its 8,400 members provide primary care and comprehensive dental specialty treatments for infants, children, adolescents and individuals with special health care needs. As advocates for children's oral health, the AAPD promotes evidence-based policies and clinical guidelines; educates and informs policymakers and parents; fosters research; and provides professional continuing education for all dentists who treat children. Learn more at *www.aapd.org*.

(Source: AAPD)

AD

The Montréal skyline is reflected in the water on a summer evening. Photo/Provided by MTOQ/Perry Mastrovito

JDIQ courses filling fast

Journées dentaires internationales du Québec May 24–28

Courses are filling fast for the Journées dentaires internationales du Québec, May 24–28, at the Palais des congrès de Montréal. As of mid-February, three courses were already sold out, meeting organizers reported.

The annual meeting of the Ordre des dentistes du Québec continues to be Canada's largest dental meeting and expects to host more than 12,000 delegates from around the world. With a scientific program with more than 100 lectures and workshops in English and French, JDIQ maintains its status as the world's most highly attended bilingual (English/French) convention.

More than 225 exhibitors will span 500 booths in the exhibit hall, Monday and Tuesday, May 27 and 28. The exhibit hall will feature a continental breakfast from 8–8:30 a.m. on both days for the early risers — and a wine-and-cheese reception closing out both days.

Featured speakers for this 43rd edition of the event include Drs. Dan Nathanson, Gerard Kugel, David Clark, Gérard Chiche, Mark Piper, George Freedman, Paresh Shah and Rhonda Savage, to name a few.

For more information, call (800) 361-4887, or visit *www.odq.qc.ca* and e-mail *congres@odq.qc.ca*.

(Source: JDIQ)

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Registration for this offer is only available on site at the Anaheim Convention Center.

The exhibit floor will feature more than 550 companies showcasing the latest in dental technology, products and services. The products and services will be on display in the 135,000-square-foot trade show floor in the Anaheim Convention Center. Event organizers say there will be more than 100 new product launches at CDA Presents in Anaheim. A number of "cool products" will receive extra attention by being on display at "The Spot." One of these products is Colgate PreviDent 5000 Booster Plus. Booster Plus contains 1.1 percent sodium FluoriGard technology and tricalcium phosphate. According to Colgate, the new formula is shown to provide better remineralization after 10 days and remineralization after 20 days.

Another "Cool Product" is XV1 by Orascoptic. XV1 is a wireless loupe and headlight in one, with a lightweight, wireless design. "Designed with ergonomics, function and style in mind, with XV1 we've addressed the top two concerns with dental loupes and headlights – we eliminated wires and battery packs to allow freedom of movement and we delivered precise counter-balance and flexible adjustment features to reduce pressure on the nose, head and ears," said Damon Baker, general manager of Orascoptic.

Air Techniques will have its Monarch product on display. The infection-control products are designed specifically for dental practices. The products are to be used on surfaces, instruments and skin and hands. "One-step disinfection saves time, and innovative packaging designs reduce plastic container waste. Anticorrosive formulas protect lines and operatory and utility equipment," Brown said.

Carestream will showcase CS Solutions, which "creates a new reality for restorative dentistry: one-visit, chairside restorations, according to Carestream literature." CS Solutions consists of an intraoral scanner, restoration design software, a milling machine and a Web portal for sharing and managing restoration cases between dentists and laboratories.

(Source: CDA Presents)

AD

Five-day, hands-on implant course presented in Jamaica

Next five-day AAIP/ADIS course is Sept. 26–30

The American Academy of Implant Prosthodontics (AAIP) joined with its affiliates, Atlantic Dental Implant Seminars (ADIS) and the Linkow Implant Institute, to present a five-day comprehensive implant training course in Kingston, Jamaica, from Jan. 13–17.

The course included lectures, surgical and prosthodontic demonstrations, hands-on participation on cadavers and anatomic manikins, diagnosis and treatment planning of implant cases, the construction of surgical templates, diagnostic wax-ups, the insertion of implants by each participant and sinus lifts under supervision of the course faculty.

45 implants, 5 sinus lifts and more

The six participating dentists inserted 45 implants, performed five sinus lifts, completed four guided bone-regeneration procedures with immediate implant placements, and made multiple impressions of various implant situations with a variety of impression materials and techniques. Patients were provided by the Jamaican Ministry of Health and the University of Technology, School of Dental Sciences, Jamaica.

Course participants were from Illinois, Jamaica, New Jersey and Texas. Upon completion of the one-week comprehensive implant training program, participating clinicians are able to accomplish the following tasks: identify cases suitable for dental implants; diagnose and treatment plan for preservation and restoration of edentulous and partially edentulous arches; demonstrate competency in the placement of single-tooth implants, soft-tissue management, and bone augmentation; obtain an ideal implant occlusion; work as part of an implant team with other professionals; and incorporate implant treatment into private practice with quality results, cost effectiveness, and profitability.

Worth 35 C.E. credits

A dental degree was required for all participants. The course is tax deductible and 35 hours of dental continuing education credits was awarded on course completion. Patient treatment is provided in a Jamaican dental school with personalized training in small-group settings. The course is a cooperative effort of the Jamaican Ministry of Health, the University of Technology, School of Dental Sciences, Jamaica and the American Academy of Implant Prosthodontics.

Dr. Mike Shulman is course coordinator, Dr. Leonard I. Linkow is course director, and Dr. Sheldon Winkler is course advisor. Course faculty, in addition to Drs. Shulman, Linkow and Winkler, include Drs. Robert Braun, Ira L. Eisenstein, E. Richard Hughes, Charles S. Mandell, Harold F. Morris, Peter A. Neff, Robert Russo and Robert E. Weiner.

Implants and components for AAIP/ADIS implant seminars are provided by HIOSSEN Dental Implants. Dental laboratory support is provided by DCA Laboratory, Citrus Heights, Calif., Dani Dental Studio, Tempe, Ariz., and Dutton Dental Concepts, Bolivar, Ohio.

Next course scheduled

The next AAIP/ADIS implant seminar in Jamaica is scheduled for Sept. 26–30.

Dr. Mike Shulman demonstrates an implant procedure to dentists at the AAIP/ADIS implant seminar. Photos/Provided by AAIP

Complete information on the AAIP/ADIS Jamaica implant continuing education programs, including tuition, faculty lectures, transportation and hotel accommodations, can be obtained from the course website, *www.adiseminars.com*, or by calling (201) 788-7663.

AAIP membership information can be obtained from the AAIP headquarters at 8672 East Eagle Claw Drive, Scottsdale, AZ, 85266-1058; telephone (480) 588-8062; fax (480) 588-8296; or send an email to *swinkdent@cox.net*. The AAIP website is *www.aaip usa.com*.

(Source: AAIP)

AD

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