



INTRODUCTION

Preface to the proceedings of the 12th international conference on the chemistry and biology of mineralized tissues

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The 12th ICCBMT meeting (Potsdam, 29 May–1 June 2017) was part of an international conference series with a long tradition; for the first time, it took place in Germany. The aim of this conference was to disseminate state-of-the-art information about the structure, function, and interactions of the mineral, extracellular matrix, and cellular components in vertebrate and invertebrate tissues such as bone, cartilage, teeth, and shells, while encouraging collaboration among multidisciplinary investigators across various diverse scientific disciplines. The format and the location of this meeting were conducive to foster significant interaction among attendees.

Collectively, the research discussed at the conference contributed to our knowledge and basic understanding of the mechanisms involved in the formation, maintenance, and repair/regeneration of mineralized tissues and ectopic mineralization of tissues. This knowledge will lead to progress in biomaterials, in bioinspired materials research, as well as improved diagnosis, treatment therapies, and, ultimately, prevention of diseases as well as dystrophic mineralization.

The Conference attracted 147 participants from the United States, Canada, Mexico, the United Kingdom, France, Italy, The Netherlands, Germany, Austria, Finland, Denmark, Israel, India, China, Japan, Sweden, Spain, and Brazil. Fifty oral presentations were delivered over 4 days without parallel sessions, with the poster session running all day long. Some posters were also selected for short flash talks.

A complete program can be viewed on <https://iccbmt.mpikg.mpg.de/program>.

This ICCBMT Conference series was founded by Prof Arthur Veis together with Prof William T. Butler and Prof Melvin Glimcher in 1981 in

Chicago and has been held approximately every 3 years since then. The ICCBMT has become one of the most important scientific gatherings in the field of basic bone and tooth research as well as biomineralization in general. The meeting series emphasizes physicochemical, biological, and clinical topics concerning mineralization processes in vertebrate and invertebrate species. These include, but are not limited to, cell and molecular biology of mineralized tissue formation, hormone and cytokine regulation of mineralized tissues, signaling pathways, structure and function of extracellular components of mineralized tissues, model systems of biomineralization, disorders and pathology of mineralized tissues and development of therapeutic approaches, and new technologies for studying crystal structure and formation.

Previous ICCBMT meetings were held across the United States and in France and Canada:

- Chicago, Illinois, United States, in 1981 (ICCBMT-1)
- Gulf-Shores, Alabama, United States, in 1984 (ICCBMT-2)
- Chatham, Massachusetts, United States, in 1988 (ICCBMT-3)
- Coronado, California, United States, in 1992 (ICCBMT-4)
- Kohler, Wisconsin, United States, in 1995 (ICCBMT-5)
- Vittel, France, in 1998 (ICCBMT-6)
- Ponte Vedra Beach, Florida, United States, in 2001 (ICCBMT-7)
- Banff, Alberta, Canada, in 2004 (ICCBMT-8)
- Austin, Texas, United States, in 2007 (ICCBMT-9)
- Carefree, Arizona, United States, in 2010 (ICCBMT-10)

- Lake Geneva, Wisconsin, United States, in 2013 (ICCBMT-11)

This pluridisciplinarity focused on mineralized tissues. The reasonable number of participants and the friendly atmosphere of the meetings have enabled a number of young Principal Investigators and students to create unique networks, thereby triggering their development. Indeed, one hallmark of the ICCBMT Conference is its focus on early career researchers to whom a total of 34 travel grants were distributed; the recipients were selected by a committee based on the quality of the submitted abstracts (see Figure 1).

The Conference was held in the city of Potsdam, which has the largest World Heritage Site in Germany, along with several important historical and cultural landmarks. As the capital and largest city of the German federal state of Brandenburg, Potsdam borders Germany's capital city, Berlin.

Around the city of Potsdam, there are a series of interconnected lakes and cultural landmarks, in particular, the parks and palaces of Sanssouci. This city was planned to embrace the ideas in the Age of Enlightenment, through a careful balance between architecture and landscape, and, it was intended as “a picturesque, pastoral dream” which reminded its residents of their relationship with nature and reason. Potsdam was a residence of the Prussian kings and the German Kaiser, until 1918. The famous Potsdam Conference, after the Second World War, was held at Palace Cecilienhof in 1945.

This Conference was dedicated to the founder of the ICCBMT Conference series, Prof Arthur Veis (see Figure 2(a)) as well as to Prof Adele Boskey (see Figure 2(b)), a pillar of the mineralized tissue world and president of the ICCBMT for many years. Professor Boskey passed away unexpectedly on 2 May 2017, just a few days before the beginning of the Conference.



Figure 1. Travel award winners together with the current ICCBMT president and the conference chairs (left side of picture).

A total of 34 awards were made to young scientists, from the USA, Canada, Israel, India, China, and various European countries. Some of these awards were sponsored by grants from the National Institutes of Health, by the German Science Foundation (DFG), and by various foundations (see logos on the right of the figure).

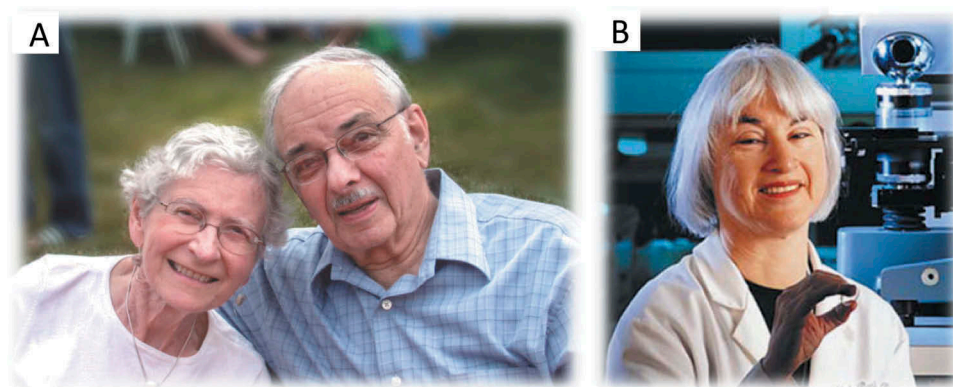


Figure 2. The conference was dedicated to the founder of the ICCBMT series, Prof Arthur Veis (A, together with his wife Eve) and to the long-term president of the ICCBMT, Prof Adele Boskey (B).

The articles that appear in this issue of *Connective Tissue Research* are based on selected contributions and constitute the Proceedings of the Conference. The contributions to this issue are highlighted in the oral program listed below.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Oral Scientific Program of the 12th ICCBMT in Potsdam, Germany

Monday, 29 May 2017—Thursday, 1 June 2017

Oral session #1: Extracellular Matrix Proteins (Chair: Anne George, Chicago, IL).

INTRO + Role of plasma protein Fetuin-A in mineralized matrix metabolism	Willi Jahnen-Dechent	RWTH Aachen, Germany
Transglutaminase 2 reactive residues and intramolecular cross-links in osteopontin	Brian Christensen	Aarhus University, Denmark
The role of FAM20B-catalyzed proteoglycans in tooth development	Xiaofang Wang	Texas A&M University, Dallas, USA
The ER Ca ²⁺ sensor STIM1 activates MAP kinase signaling upon DMP1 stimulation in osteoblasts and promotes differentiation by activating cyclin D1	Yinghua Chen	University of Illinois, Chicago, USA
Localization of keratin-75 in rodent ameloblasts by immunochemical techniques	Xu Yang	University of Pittsburgh, USA
Temporal and spatial correlation between gene expression and mineralization in the avian leg tendon	William Landis	University of Akron, Ohio, USA
TRIP-1, an endoplasmic resident protein functions in the extracellular matrices of bone and dentin	Amsa Ramachandran	University of Illinois, Chicago, USA
Polymorph selectivity of coccolith-associated polysaccharides	Jessica Walker	University of Edinburgh, Scotland, UK
The unique biomineralization transcriptome and proteome of the teeth of the camarodont sea urchin <i>Lytechinus variegatus</i> (Lv).	Arthur Veis	Northwestern, Evanston, USA

Oral session #2: Cell Biology & Genetics (Chair: Jane B. Lian, Burlington, VT)

INTRO + DLX3 in amelogenesis: from understanding the pathogenicity of TDO syndrome to identifying novel genes involved in enamel development and tooth decay risk.	Olivier Duverger	NIH Bethesda, USA
Conserved long noncoding RNA expression regulates mesenchymal stromal cell commitment and differentiation to the osteoblast lineage	Coralee Tye	University of Vermont, USA
Collagen type XV is strictly associated to human mesenchymal stem cells mineralization ability	Cristina Manfredini	Rizzoli Orthopaedic Institute, Bologna, Italy
Ultrastructural cell and mineral phenotype in human FAM20A gene mutations	Ariane Berdal	Rothschild Hospital, Paris, France
Intrinsically disordered proteins drive enamel formation via an evolutionarily conserved self-assembly motif.	Frantisek Spoutil	Academy of Sciences, Prague, Czech Republic
Epigenetic remodeling and modification to preserve skeletogenesis <i>in vivo</i>	Mohammad Hassan	School of Dentistry, University of Alabama, USA
Matrix vesicle miRNAs regulate extracellular matrix in growth plate chondrocytes	Barbara Boyan	Virginia Commonwealth University, Richmond, USA
Chondrocytes originated from Meckel's cartilage and mandibular symphysis directly contribute to mandibular bone formation during early development	Chaoyuan Li	Texas A&M University, Dallas, USA

Oral session #3: Osteocyte networks (Chair: Peter Fratzl, Potsdam, Germany).

INTRO + The role of the aging osteocyte in the musculoskeletal system	Lynda F Bonewald	IUSM Indianapolis, USA
Cellular responses to elevated phosphate—molecular mechanisms of phosphate-induced mineralization	Dobrawa Napierala	University of Pittsburgh, USA
Correlative analysis of the osteocyte network density and bone mineralization	Andreas Roschger	Max Planck Institute, Potsdam, Germany
Canalicular junctions in osteocyte networks revealed by X-ray nanotomography	Henrik Birkedal	Aarhus University, Denmark
Lost in evolution: novel form of modeling bypasses the need for osteocytes in the adaptation of bones to mechanical loading	Lior Ofer	Koret School of Veterinary Medicine, Hebrew University Jerusalem, Israel

Oral session #4: Mineralization mechanisms (Chairperson: Elia Beniash, Pittsburgh, PA).

INTRO + Biomineralization pathways: from ion transport to mineral assembly and deposition in soft skeletal forming tissues	Lia Addadi	Weizmann Institute, Rehovot, Israel
Insights into the molecular mechanism of vascular calcification using both <i>in vitro</i> and <i>in vivo</i> models	Ophélie Gourgas	McGill University, Montreal, Canada
Cooperation between amelogenin and enamelin in forming calcium phosphate is dose dependent	Janet Moradian-Oldak	University of Southern California, Los Angeles, USA
The enamel proteins Amelotin and Odam induce hydroxyapatite mineralization in a collagen matrix	Bernhard Ganss	University of Toronto, Canada
Diversity versus similarity of the structure and composition of modern avian calcified eggshells	Yannicke Dauphin	Museum national d'histoire naturelle, Paris, France

Oral session #5: Structural & functional characterization (Chair: Nico Sommerdijk, Eindhoven).

INTRO + Revisiting the collagen/mineral assembly pattern in bone: the possible role of cross-fibrillar mineralization	Roland Kröger	University of York, UK
Transmission electron microscopic study of mineralization of collagen in newborn mice	Henry P Schwarcz	McMaster University, Hamilton, Ontario, Canada
Characterization of compositional gradients in the meniscal entheses by Raman spectromicroscopy	Alexander Boys	Cornell University, Ithaca, USA
Unraveling the process of collagen mineralization	Anat Akiva	Eindhoven University of Technology, NL
Repair and regeneration of sea urchin spines	Marie Alberic	Max Planck Institute, Potsdam, Germany
In-situ SAXS study of de-hydration and re-hydration of human dentine	Lukas Ludescher	University Leoben, Austria
Curvature control of bone tissue growth <i>in-vitro</i>	Sebastian Ehrig	Max Planck Institute, Potsdam, Germany
Bone mineral density distribution as a footprint of bone physiology in growth, health, and disease	Pascal R. Buenzli	Monash University, Australia
Structural properties of hypermineralized tissue in aged human proximal femur	Tengteng Tang	University of British Columbia, Canada
Bone structure in three dimensions: lamellae and trabeculae	Steve Weiner	Weizmann Institute, Rehovot, Israel

Oral session #6: Metabolic and hereditary diseases (Chair: Mary MacDougall, Birmingham, AL).

INTRO + Osteopontin accumulation in the osteocyte lacuno-canalicular network contributes to the defective bone mineralization of X-linked hypophosphatemia	Marc McKee	McGill University, Montreal, Canada
Crosstalk between sensory neuropeptides regulating heterotopic ossification in tendon	Ceren Tuzmen	Carnegie-Mellon University, Pittsburgh, USA
Bone with uncleavable type I collagen C-propeptide has abnormal development of multiple bone cell populations and increased bone matrix mineralization	Joan C. Marini	NICHD/NIH Bethesda, USA
IFITM5 mutation in atypical OI Type VI is associated with lack of PEDF within the bone matrix, osteoidosis, hypermineralization and impaired endochondral ossification	Nadja Fratzl-Zelman	Ludwig Boltzmann Institute of Osteology, Vienna, Austria
Structural effects of amelogenin on hydroxyapatite due to naturally occurring mutations	Wendy J. Shaw	Pacific Northwest National Lab, Richland, USA
Alveolar bone versus cementum: tissue specific response to X-linked hypophosphatemic rickets	Claire Bardet	Université Paris Descartes, France

Oral session #7: Translational/bioinspirational research (Chair: Barbara D. Boyan, Richmond, VA).

INTRO + Applications of the cell lineage tracing technique in bone and teeth development studies	Jian Q Feng	Texas A&M College of Dentistry, Dallas, Texas, USA
Bone repair with Raloxifene and bioglass nanoceramic composite	Paulo Noronha Lisboa-Filho	São Paulo State University, Bauru, Brazil
Multiscale form and function reveals insights into human renal biomineralization	Sunita P. Ho	University of California San Francisco, USA
Magnesium oxide, hydroxyapatite and bone healing	Håkan Nygren	University of Gothenburg, Sweden
Biological responses of bone marrow stem cells to depleted dentine matrix	Rachel J Waddington	Cardiff University, UK
A modified polysaccharide-based hydrogel for enhanced osteogenic maturation and mineralization independent of differentiation factors	Luna Goswami	KIIT University, Bhubaneswar, India
A FAK-YAP-mTOR signaling axis regulates stem cell-based dental renewal in mice	Ophir Klein	University of California, San Francisco, USA
Towards multi-scale engineering of biomimetic bone microenvironments—pre-vascularized, cell-laden high-density bone-derived hydrogels mineralized on the nanoscale	Luiz Eduardo Bertassoni	Oregon Health and Science University, Portland, USA

Eve and Arthur Veis Keynote lecture (Chairs: Anne George, Ariane Berdal, Peter Fratzl).

Soft materials to build hard tissues	Dave Mooney	Harvard SEAS, Cambridge, USA
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