

Oliver Thews · Joseph C. LaManna
David K. Harrison *Editors*

Oxygen Transport to Tissue XL

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Oxygen Transport to Tissue XL

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*A Special Tribute to Professors Dr. med.
Dr. rer. nat. Gerhard Thews and Dr. med.
Oliver Thews: Like Father, Like Son*

Duane F. Bruley^{a,b}

^aISOTT Historian, ^bSynthesizer, Inc., USA

ISOTT was founded by Drs. Duane F. Bruley and Haim I. Bicher in the state of South Carolina, USA, in 1973, where they served as copresidents and Dr. Melvin H. Knisely as honorary president of the first meeting. At that meeting, an election was held, and Prof. Dr. Dr. Gerhard Thews became the first elected president and served as the president of our second meeting, held at the University of Mainz, in Mainz, Germany, in 1975. Fast forward 42 years, ISOTT is being held in Halle, Germany, with his son, Prof. Dr. Oliver Thews, serving as the president of the 2017 meeting. In addition, because of his commitment and proficiency, Oliver has served as our secretary for many terms.

Both father and son have been long-standing members of ISOTT and have greatly enriched our scientific base and society leadership. Gerhard Thews became very well known for his book on Human Physiology, coauthored with Robert F. Schmidt, and Oliver then followed closely in his father's footsteps to become an internationally recognized scientist on oxygen transport to tissue. They both had a significant research impact on respiratory physiology and oncology. Gerhard

*passed away in 2003, and Oliver has continued to pursue excellence in this field. Both men have been uniquely instrumental to the evolution of ISOTT and therefore deserve special recognition with this **Tribute**.*



Prof. Dr. Gerhard Thews



Prof. Dr. Oliver Thews

Preface

This volume is the publication of papers presented at the 45th Annual Meeting of the International Society on Oxygen Transport to Tissue (ISOTT) held from August 19 to 23, 2017, at the Martin Luther University (MLU) in Halle/Saale, Germany. It contains the papers submitted, reviewed, and accepted from presentations at that meeting. These papers reflect a broad spectrum of different topics dealing with all aspects of oxygen transport from the air to the consuming cells.

The president of ISOTT, Oliver Thews, who organized the meeting together with his team, in particular Anne Riemann, Sarah Reime, and Verena Haupt, welcomed 136 participants in the historical lecture hall, the so-called Löwengebäude (“Lions Building”), of the University of Halle. The participants came from 15 different countries all over the world, mostly from Germany, Japan, the USA, the UK, and Korea. The Martin Luther University has a more than 500-year tradition. It was created in 1817 when the University of Wittenberg (founded in 1502) merged with Friedrichs University Halle (founded in 1694). Today the university has almost 20,000 students (more than 1600 of them are foreign students) and offers a wide range of academic subjects in the areas of humanities, social sciences, natural sciences, and medicine.

In the scientific part of the meeting, a broad spectrum of the aspects of oxygen transport to tissue was addressed. Major topics in the meeting were near-infrared spectroscopy (technical aspects as well as many different applications), oxygen supply to the brain under normal and different pathological conditions, the role of oxygen and hypoxia in oncology and radiobiology, the importance of O₂ in the clinical setting (e.g., in critical care medicine), the process of oxygen diffusion through membranes, oxidative stress, oxygen transport in the blood, mitochondrial function, and the biology of the primo vascular system. The scientific program included a total of 63 oral and 42 poster presentations. In addition, seven keynote talks were given by Dirk Vordermark (University of Halle, Germany), Martin Wolf (ETH Zurich, Switzerland), Gillian M. Tozer (University of Sheffield, UK), Joseph C. LaManna (Case Western Reserve University, Cleveland, USA), Karsten Mäder (University of Halle, Germany), Agnes Görlach (German Heart Centre, Munich, Germany), and Giuseppe Cicco (University of Bari, Italy). The conference was supported by generous sponsorship from the City of Halle, the Martin Luther University Halle, the Medical Faculty of the MLU, Hamamatsu Photonics, Oxford Optronix, and the University Hospital Halle/Saale.

Besides the inspiring scientific program, ISOTT 2017 offered various social evening events to give the participants an impression of the vibrant life of the university city of Halle. These events also served to allow fruitful scientific discussion in a relaxed atmosphere. On Sunday the participants visited a local microbrewery (“Hallesches Brauhaus”), and on Monday evening in the saline museum the attendees learned how Halle became a prosperous city from making salt. The Award Ceremony and Banquet concluded the meeting on Wednesday evening in the German National Academy of Sciences “Leopoldina” during which the Melvin H. Knisely Award was presented to Felix Scholkmann, the Dietrich W. Lübbers Award to Ben Jones, and the Britton Chance Award to Helene Isler. In addition, ten Duane Bruley Travel Awards were presented to junior scientists Luca Giannoni, Jingjing Jiang, Alexander Kalyanov, Zuzana Kovacsova, Nassim Nasser, Maheen Faisal Siddiqui, Shun Takagi, Yusuke Tsuruno, Lina Xu, and Hamoon Zohdi. The ISOTT 2017 meeting ended with the handing over of the banner of the annual ISOTT meeting to the next ISOTT presidents, Pan Dong Ryu and Kyung A. Kang.

Halle/Saale, Germany

Oliver Thews

Acknowledgments

As the president of the 45th Annual Meeting of the International Society on Oxygen Transport to Tissue, held on August 19–23, 2017, in Halle (Saale), Germany, I would like to gratefully acknowledge the generous support of our sponsors.



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ISOTT Award Winners

The Melvin H. Knisely Award

The Melvin H. Knisely Award was established in 1983 to honor Dr. Knisely's accomplishments in the field of the transport of oxygen and other metabolites and anabolites in the human body. Over the years, he has inspired many young investigators, and this award is to honor his enthusiasm for assisting and encouraging young scientists and engineers in various disciplines. The award is to acknowledge outstanding young investigators. This award was first presented during the banquet of the 1983 annual conference of ISOTT in Ruston, Louisiana. The award includes a Melvin H. Knisely plaque and a cash prize.

Melvin H. Knisely Award Recipients

1983	Antal G. Hudetz (Hungary)
1984	Andras Eke (Hungary)
1985	Nathan A. Bush (USA)
1986	Karlfried Groebe (Germany)
1987	Isumi Shibuya (Japan)
1988	Kyung A. Kang (Korea/USA)
1989	Sanja Batra (Canada)
1990	Stephen J. Cringle (Australia)
1991	Paul Okunieff (USA)
1992	Hans Degens (the Netherlands)
1993	David A. Benaron (USA)
1994	Koen van Rossem (Belgium)
1995	Clare E. Elwell (UK)
1996	Sergei A. Vinogradov (USA)
1997	Chris Cooper (UK)
1998	Martin Wolf (Switzerland)
1999	Huiping Wu (USA)
2000	Valentina Quaresima (Italy)
2001	Fahmeed Hyder (Bangladesh)
2002	Geofrey De Visscher (Belgium)
2003	Mohammad Nadeem Khan (USA)

2004	Fredrik Palm (Sweden)
2005	Nicholas Lintell (Australia)
2006	–
2007	Ilias Tachtsidis (UK)
2008	Kazuto Masamoto (Japan)
2009	Rossana Occhipinti (USA)
2010	Sebastiano Cicco (Italy)
2011	Mei Zhang (USA)
2012	Takahiro Igarashi (Japan)
2013	Malou Friederich-Persson (Sweden)
2014	David Highton (UK)
2015	Alexander Caicedo Dorado (Belgium)
2016	Sally Pias (USA)
2017	Felix Scholkmann (Switzerland)

The Dietrich W. Lübbers Award

The Dietrich W. Lübbers Award was established in honor of Professor Lübbers's long-standing commitment, interest, and contributions to the problems of oxygen transport to tissue and to the society. This award was first presented in 1994 during the annual conference of ISOTT in Istanbul, Turkey.

Dietrich W. Lübbers Award Recipients

1994	Michael Dubina (Russia)
1995	Philip E. James (UK/USA)
1996	Resit Demit (Germany)
1997	Juan Carlos Chavez (Peru)
1998	Nathan A. Davis (UK)
1999	Paola Pichiule (USA)
2000	Ian Balcer (USA)
2001	Theresa M. Busch (USA)
2002	Link K. Korah (USA)
2003	James J. Lee (USA)
2004	Richard Olson (Sweden)
2005	Charlotte Ives (UK)
2006	Bin Hong (China/USA)
2007	Helga Blockx (Belgium)
2008	Joke Vanderhaegen (Belgium)
2009	Matthew Bell (UK)
2010	Alexander Caicedo Dorado (Belgium)
2011	Malou Friederich-Persson (Sweden)
2012	Maria Papademetriou (UK)
2013	Nannan Sun (China/USA)
2014	Felix Scholkmann (Switzerland)
2015	Shun Takagi (Japan)

- 2016 Gemma Bale (UK)
2017 Ben Jones (UK)

The Britton Chance Award

The Britton Chance Award was established in honor of Professor Chance's long-standing commitment, interest, and contributions to the science and engineering aspects of oxygen transport to tissue and to the society. This award was first presented in 2004 during the annual conference of ISOTT in Bari, Italy.

Britton Chance Award Recipients

- 2004 Derek Brown (Switzerland)
2005 James Lee (USA)
2006 Hanzhu Jin (China/USA)
2007 Eric Mellon (USA)
2008 Jianting Wang (USA)
2009 Jessica Spires (USA)
2010 Ivo Trajkovic (Switzerland)
2011 Alexander Caicedo Dorado (Belgium)
2012 Felix Scholkmann (Switzerland)
2013 Tharindi Hapuarachchi (UK)
2014 Anne Riemann (Germany)
2015 Wenhao Xie (China)
2016 Linda Ahnen (Switzerland)
2017 Helene Isler (Switzerland)

The Duane F. Bruley Travel Awards

The Duane F. Bruley Travel Awards were established in 2003 and first presented by ISOTT at the 2004 annual conference in Bari, Italy. This award was created to provide travel funds for student researchers in all aspects of oxygen transport to tissue. The awards signify Dr. Bruley's interest in encouraging and supporting young researchers to maintain the image and quality of research associated with the society. As a cofounder of ISOTT in 1973, Dr. Bruley emphasizes cross-disciplinary research among basic scientists, engineers, medical scientists, and clinicians. His pioneering work constructing mathematical models for oxygen and other anabolite/metabolite transport in the microcirculation, employing computer solutions, was the first to consider system nonlinearities and time dependence, including multidimensional diffusion, convection, and reaction kinetics. It is hoped that receiving the Duane F. Bruley Travel Award will inspire students to excel in their research and will assist in securing future leadership for ISOTT.

The Duane F. Bruley Travel Award Recipients

- 2004 Helga Blockx (Belgium), Jennifer Caddick (UK), Charlotte Ives (UK), Nicholas Lintell (Australia), Leonardo Mottola (Italy), Samin Rezaia (USA/Iran), Ilias Tachtsidis (UK), Liang Tang (USA/China), Iyichi Sonoro (Japan), Antonio Franco (Italy)
- 2005 Robert Bradley (UK), Harald Oey (Australia), Kathy Hsieh (Australia), Jan Shah (Australia)
- 2006 Ben Gooch (UK), Ulf Jensen (Germany), Smruta Koppaka (USA), Daya Singh (UK), Martin Tisdall (UK), Bin Wong (USA), and Kui Xu (USA)
- 2007 Dominique De Smet (Belgium), Thomas Ingram (UK), Nicola Lai (USA), Andrew Pinder (UK), Joke Vanderhaegen (Belgium)
- 2008 Sebastiano Cicco (Italy)
- 2009 Lei Gao (UK), Jianting Wang (USA), Obinna Ndubizu (USA), Joke Vanderhaegen (Belgium)
- 2010 Zareen Bashir (UK), Tracy Moroz (UK), Mark Muthalib (Australia), Catalina Meßmer (USA), Takashi Eriguchi (Japan), Yoshihiro Murata (Japan), Jack Honeysett (UK), Martin Biallas (Switzerland)
- 2011 Catherine Hesford (UK), Luke S. Holdsworth (UK), Andreas Metz (Switzerland), Maria D. Papademetriou (UK), Patrik Persson (Sweden), Felix Scholkmann (Switzerland), Kouichi Yoshihara (Japan)
- 2012 Allann Al-Armaghany (UK), Malou Friederich-Persson (Sweden), Tharindi Hapuarachchi (UK), Benjamin Jones (UK), Rebecca Re (Italy), Yuta Sekiguchi (Japan), Ebba Sivertsson (Sweden), Andre' Steimers (Germany)
- 2013 Allann Al-Armaghany (UK), Gemma Bale (UK), Alexander Caicedo Dorado (Belgium), Luke Dunne (UK)
- 2014 Geraldine De Preter (Belgium), Benjamin Jones (UK), Stefan Kleiser (Switzerland), Nassimsadat Nasser (Switzerland), Marie-Aline Neveu (Belgium), Shinsuke Nirengi (Japan), Takuya Osawa (Japan)
- 2015 Nannan Sun (China), Gemma Bale (UK), Chenyang Gao (China), Guennadi Saiko (Canada), Kuangyu Shi (Germany), Phong Phan (UK), Chae Jeong Lim (Korea)
- 2016 Isabel De Roever (UK), Yuya Enokida (Japan), Jingjing Jiang (Switzerland), Frédéric Lange (UK), Andreas J. Metz (Switzerland), Shun Takagi (Japan)
- 2017 Luca Giannoni (UK), Jingjing Jiang (Switzerland), Alexander Kalyanov (Switzerland), Zuzana Kovacsova (UK), Nassim Nasser (Switzerland), Maheen Faisal Siddiqui (UK), Shun Takagi (Japan), Yusuke Tsuruno (Japan), Lina Xu (Germany), Hamoon Zohdi (Switzerland)

Kovach Lecture

The Kovach Lecture is presented periodically to honor a career dedicated to oxygenation research. Arisztid Kovach was a world-renowned cardiovascular physiologist and one of the early leaders of ISOTT. This lecture is dedicated to his remarkable scientific and teaching career.

Kovach Lecture Recipients

2011	John Severinghaus
2012	Peter Vaupel
2014	Edwin Nemoto

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Part I

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