Volume 14, No. 3, March 2022

WELCOME

I am presently at the ACS Spring Meeting in San Diego, and I thought things were really starting to look good for the first time in two years. Unfortunately, we are now dealing with the military action in Ukraine and the destruction of lives and property it has brought. Instead of placing the useful links near the bottom, I thought I would place them here: Help Humanitarian Efforts in Ukraine, Donate to Children of Ukraine, Nova Ukraine, Razom for Ukraine, World Central Kitchen, Global Giving, International Committee of the Red Cross. I have not vetted all these relief efforts myself, but I have made a donation to ICRC. There are many ways to help Ukraine; these are just a few.

Be safe,

Joe

LABORATORY IN THE SPOTLIGHT

Professor Anthony Linden
University of Zurich

The Department of Chemistry at the University of Zurich, Switzerland, has just installed a second XtaLAB Synergy-S in their X-ray Crystallography Facility, which currently has 4 diffractometers—3 single crystal and 1 powder—all from Rigaku. The facility has been directed by Professor Anthony Linden since his arrival in Europe in 1989, having moved there from his home country of Australia via a postdoctoral position in Canada.

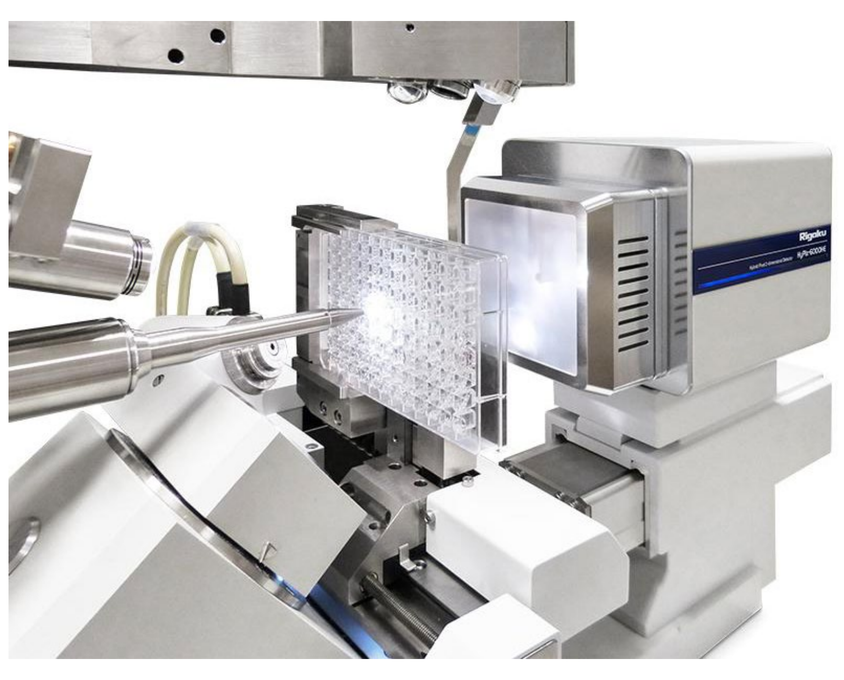
Professor Linden has been an active member of the crystallographic community for nearly 40 years, making many valuable contributions over his career, including 20 years as a co-editor and subsequently as a main editor of *Acta Crystallographica*, Section C until 2017. He is currently serving on the editorial advisory board of *Acta Crystallographica*, Section E. Professor Linden also cofounded the highly regarded Zurich School of Crystallography (ZSC) together with Professor Hans-Beat Bürgi in 2007, bringing together experienced crystallographers from around Switzerland and beyond to serve as tutors.

The ZSC is an intensive course usually held every 2 years that covers everything from crystal growth all the way to preparing publications. The ZSC aims to give newcomers to small molecule crystallography the best possible start in the field and is designed with a ratio of tutors to students, of 1:2. This enables the school to be taught in an entirely hands-on fashion, with students getting a lot of personal attention from the experts. Through this, the ZSC has established a strong international reputation for quality teaching, and places are highly sought after. This year's course, beginning in June, is already full. Many early participants of the school are still very active in the crystallographic community and now send their own students to the school. In 2018, Professors Linden and Bürgi even took the school abroad, offering students in Tianjin, China the opportunity to learn from the highly experienced team.

We were surprised to learn that Professor Linden will be retiring in May but are pleased to hear that Professor Bernhard Spingler will succeed him as director of the X-ray Crystallography Facility. We hope Professor Linden enjoys his well-earned retirement, and everyone at Rigaku Oxford Diffraction would like to wish him all the best for the future. He says he hopes to remain active at various events, such as schools and conferences, so we look forward to meeting him again soon.

PRODUCT IN THE SPOTLIGHT

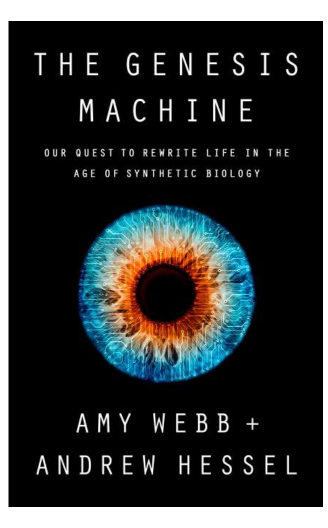
XtalCheck-S



As instrumentation gets faster and smarter, automation becomes more and more valuable. The XtalCheck-S is an attachment for our XtaLAB Synergy diffractometers that can enable automated *in-situ* screening of samples in crystallization plates. The XtalCheck-S was originally designed for protein crystallographers who are accustomed to conducting crystallization screening in SBS format crystallization plates. The XtalCheck-S enables these plates to be loaded onto a diffractometer for in-situ X-ray screening of crystals within the drops without the need to remove or otherwise disturb the sample. That means you can have advanced knowledge of sample's crystallinity before running it on your in-house diffractometer or taking it to a synchrotron.

Though originally intended for protein screening, the system can be easily used for other methods, such as batch screening of powder samples which will be the subject of an upcoming TOPIQ webinar on March 30, 2022.

BOOK REVIEW



The Genesis Machine: Our Quest to Rewrite Life in the Age of Synthetic Biology
By Amy Webb and Andrew Hessel
ISBN: 978-1-5417-9791-8

The Genesis Machine: Our Quest to Rewrite Life in the Age of Synthetic Biology is a collaborative work between Amy Webb, a quantitative futurist and author of *The Big Nine: How the Tech Titans and Their Thinking Machines Could Warp Humanity*, and Andrew Hessel, a microbiologist and geneticist who co-founded both Humane Genomics, Inc. and Genome Project-write. This book does for CRISPR and the future of genetic modification what *The Big Nine* did for artificial intelligence and the future of machine learning. You won't be able to put it down even when it gets too real too quickly and you desperately want to. It's a bit like watching a prestige horror movie. You think you might know how it's going to end, but the jump scares still get you.

The introduction is deeply personal—both Webb and Hessel write their own anecdotes in the first person regarding their respective struggles with procreation. Webb writes of her deep pain following several miscarriages, and Hessel writes of the unforeseen impact of his change of heart regarding having children at all. They set the stage with a very emotional entrance—here are two people who stand to benefit from all the positive reproductive science advancements fueled by our increased understanding of DNA.

Webb, joined this time by Hessel, starts with Part I, titled "Origin," providing her readers with a solid foundation for understanding the building blocks of life and the history of human knowledge of DNA. Webb is a futurist by profession, so all the historical context provided at the beginning of the book is merely intended to provide critical momentum for the conversation moving forward—the true crux of the book. It's concise and clearly articulated, such that anyone who lacked professional scientific training could engage with this first part and be prepared to fully comprehend and engage with what comes next. This section, while decidedly well written in Webb's typically accessible prose, doesn't necessarily contain anything intriguingly original. A reader with an intimate knowledge of the history of DNA discovery, the Human Genome Project, and CRISPR could easily breeze through to Part II.

Part II, titled "Now," delves into exactly that: the present state of synthetic biology. Split into four chapters, "Now" explores what Webb and Hessel dub the current "bioeconomy;" the foundation of the current "biological age," defined by a rapid acceleration in biology-based innovations; and the nine risks of the current bioeconomy and biological age and what they potentially portend for the future of the human race. The section ends with a detailed anecdote about golden rice—a specific strain of rice that was especially engineered to contain more nutrients. Many people are horrified by the concept of genetically modified organisms, or GMOs, but chances are they've benefited from eating one.

Part III, entitled "Futures," is where things start to get freaky, a classic Webb move that echoes *The Big Nine*. Webb and Hessel present five detailed scenarios of possible futures where, for example, the bioeconomy has grown, uncontrolled and unfettered by any government regulation, leading to bespoke child curation or one where forced retirement is the norm and the side effects of aging are negated. These potential futures are spooky and surreal—while also being entirely and completely plausible, which is truly the most terrifying part of it all.

Webb and Hessel end on an optimistic note—the future, or rather these futures, are not set in stone. Anything could happen over the course of the next few decades that could ultimately decide the course of human history as it pertains to biological manipulation.

The Genesis Machine is an excellent follow-up to *The Big Nine.* Just don't read it before you go to sleep.

Jeanette S. Ferrara, MFA

RIGAKU TOPIQ WEBINARS

Rigaku has developed a series of 20–30 minute webinars that cover a broad range of topics in the fields of X-ray diffraction, X-ray fluorescence and X-ray imaging. You can register here and also watch recordings if you cannot attend live sessions.

VISIT US AT:

Pair Distribution Function (PDF) Workshop, Zoom Webinar, April 6–7.

38th BCA Spring Meeting, Leeds, UK, April 11–14.

2022 MRS Spring Meeting and Exhibit, Honolulu, Hawai'i, May 8–13.

5th International School on Aperiodic Crystals, Kutna Hora, Czechia, May 23–27.

Canadian Chemical Crystallography Workshop, Calgary, Canada, June 9–12.

ACA Summer School, West Lafayette, IN, June 12–18.

Canadian Chemistry Conference and Exhibition 2022, Calgary, Canada, June 13–17.

72nd ACA Annual Meeting, Portland, Portland, OR, July 29–August 3.

33rd European Crystallographic Meeting, Versailles, France, August 23–27.

44th International Conference on Coordination Chemistry, Rimini, Italy, August 28–September 2.

MOF2022, Dresden, Germany, September 4–7.

CRYSTALLOGRAPHY IN THE NEWS

February 16, 2022: Researchers from France, Spain and the US used NMR and X-ray crystallography to visualize protein breathing motions associated with aromatic ring flipping.

February 25, 2022: Scientists from South Korea and the US review the importance of the A cation in organic-inorganic lead halide perovskites.

March 3, 2022: Researchers from Germany, Israel, Switzerland, The Netherlands and the US combined time-resolved X-ray crystallography, spectroscopy, and computational simulations to generate a movie of chloride transport through a chloride-pumping rhodopsin.

March 4, 2022: Researchers at Nagoya University have synthesized and characterized a tetraorganyl-alumaborane with an Al–B σ-bond along with several oxidation products.

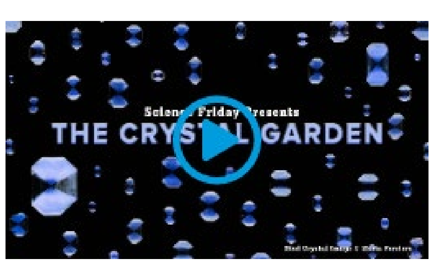
March 9, 2022: Scientists from France and Germany report the synthesis and characterization of a europium molecular crystal with ultra-narrow optical linewidths.

March 9, 2022: Researchers from Germany and Spain discovered and characterized a Ni(II)-dependent guanidine hydrolase from *Synechocystis* that allows the organism to extract nitrogen from guanidine.

March 17, 2022: Researchers from the Scripps Institute report the concise syntheses of GB22, GB13, and himgaline by cross-coupling and complete reduction, with characterization of two intermediates by X-ray crystallography.

VIDEO OF THE MONTH

Here are links to the videos that go with the February 16th paper describing protein breathing motions above: Supplementary Video 1 and Supplementary Video 2.



This Artist Uses Chemistry To Create Mind-Boggling Crystal Images (sciencefriday.com)

Maria Ferreira provided an artist's perspective on crystal growth in this ScienceFriday video.

JOIN US ON LINKEDIN

Our LinkedIn group shares information and fosters discussion about X-ray crystallography and SAXS topics. Connect with other research groups and receive updates on how they use these techniques in their own laboratories. You can also catch up on the latest newsletter or *Rigaku Journal* issue. We also hope that you will share information about your own research and laboratory groups.

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RIGAKU X-RAY FORUM

At rigakuxrayforum.com you can find discussions about software, general crystallography issues and more. It's also the place to download the latest version of Rigaku Oxford Diffraction's CrysAlis^{Pro} software for single crystal data processing.

JOIN HERE