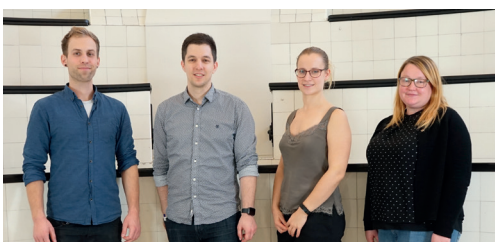
HIRI HELMHOLTZ
Institute for RNA-based Infection Research

ANNUAL REVIEW 2019

In 2019, the HIRI continued to gain momentum. With a newly recruited Helmholtz Young Investigator, we now have eight research groups making the cutting-edge science at HIRI internationally visible. Five PhD students were recruited through our graduate program “RNA & Infection”, making a total of 60 staff members from 17 nations. Renowned figures from science and culture visited the institute, and the new HIRI building embarked upon project planning and detailed design.

PERSONNEL

Mathias Munschauer (previously at the Broad Institute of MIT and Harvard, Cambridge, MA) started his new Helmholtz Young Investigators Group “LncRNA in Infections” (LRIB) on July 1st. With the affiliation of Lorenz Meinel (Chair of Pharmaceutical Technology and Biopharmacy) and Utz Fischer (Chair of Biochemistry), a total of four chair holders of the Julius-Maximilians-University of Würzburg (JMU) are now associated with the HIRI. Peter Fineran (Otago, NZ) secured a Humboldt Fellowship with the support of HIRI group leader Chase Beisel and began his visits to HIRI as guest scientist in October. At the end of the year, HIRI has eight working groups with over 60 staff from 17 nations.



HIRI’s new Helmholtz Young Investigator Group “LncRNA in Infections“. From left to right: Jens Ade, Mathias Munschauer, Sabina Ganskih, Simone Werner. Image: Hilde Merkert, © HIRI / HZI

NEW BUILDING

Winner’s model new HIRI building. © *doranth post architekten GmbH*

At the beginning of the year, the contract for the construction of the new HIRI building was signed with the architectural office *doranth post architekten* (Munich). This was followed by the planning of demolition and site clearance by the *Staatliches Bauamt Würzburg*. After the kick-off meeting in March, the planning team “new HIRI building” began its regular meetings. In July, the ground lease and permission contracts were signed. This gave the HIRI the go-ahead for the construction of the new building on the grounds of the University Hospital.

SEMINARS

Full house at the opening of the RNA seminar in WS2019/2020 with Anna Pyle and Gisela Storz. Image: Tim Schnyder, © HIRI/HZI

Renowned international scientists enriched this year‘s RNA seminar as speakers. In the winter semester, Ciarán Condon (CNRS, Université de Paris, France), Peter Nielsen (University of Copenhagen, Denmark), Thorsten Stafforst (University of Tübingen, Germany), and Noam Stern-Ginossar (Weizmann Institute of Science, Israel) gave insights into their work. In the summer semester, Chris Ponting (University of Edinburgh, Scotland), and Daniel Wilson (University of Hamburg, Germany) presented their research. The following winter semester opened with a double bill of Anna Pyle (Yale University, USA; currently President of the RNA Society) and Gisela Storz (NIH, Bethesda, USA). Closing off the year, HIRI heard talks from the new CIIM director Yang Li (Hannover, Germany), Markus Landthaler (Max Delbrück Center Berlin, Germany), and Samuel Sternberg (Columbia University, New York, USA).

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PROMOTION AND YOUNG SCIENTISTS

Excerpt from the poster announcing the HIRI Graduate Training Program. © HIRI/HZI

As part of the first call for the HIRI "RNA & Infection" graduate program, HIRI selected two doctoral students from a large pool of applicants. These high calibre students, Sandra Gawlitt and Christophe Toussaint, completed their three internships in the research groups of their choice before choosing their supervisor and project for their doctoral thesis. In the second call in late summer 2019, HIRI recruited three successful applicants, Elise Bornet, Marco Olguin, and Sebastian Zielinski, with their lab rotations set to begin in early 2020.

HIRI is becoming increasingly involved in teaching at JMU. In May, the three-day intensive course "Infection Biology" took place for the first time. This course complements the "RNA Biology" intensive course offered in autumn. Both courses are part of the HIRI "RNA & Infection" program, and are intended to provide future scientists with a solid knowledge base in the fields of RNA and infection biology.

In the winter term 2018/19 Emmanuel Saliba started his lecture series "Single Cell Biology" at the JMU Würzburg with 24 students.

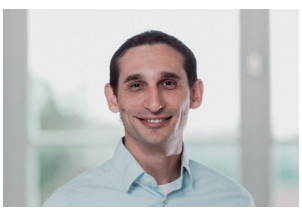
INFRASTRUCTURE

The HIRI acquired several new pieces of laboratory equipment. At the beginning of the year, the MST Nanotemper was installed to measure the interactions between molecules using fluorescence. This was followed by the Illumina Miniseq allowing HIRI research groups access to fast and efficient sequencing. Finally, a device for "medium pressure liquid chromatography" (MPLC), the chemical separation and enrichment of certain components from a mixture of substances, complemented the HIRI's laboratory equipment.

The institute's transportation fleet was opened with the brand new HIRI scooter, allowing HIRI staff to leave the long distances on the first floor behind them in a matter of seconds. At the end of the year, the HIRI scooter was joined by the e-bike "Matthias". From now on, HIRI employees can reach the Hubland campus in a time and environmentally friendly way, while still doing something for their own fitness.

HIRI e-bike "Matthias" and HIRI employees getting their e-bike driving licence. © HIRI / HZI

RESEARCH FUNDING



HIRI group leader Chase Beisel obtains the first ERC grant for the institute. Image: Mario Schmitt, ©HIRI / HZI

Within the framework of the so-called "Program-oriented Funding (POF)", the Helmholtz Association regularly evaluates the research performance and future research plan of all its research fields and institutions. As part of the Helmholtz Centre for Infection Research (HZI), the submitted concept of the HIRI Research Field (Topic 1) was rated "outstanding".

With his project "CRISPR Combo", Chase Beisel received a 2 million euro 'Consolidator Grant' – the first ERC Grant at HIRI. This award will be used to study CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats). CRISPR are sections of repeating DNA that occur in the genomes of many bacteria and archaeae and are the basis of CRISPR

technologies that have revolutionized how genetic modifications are made in different organisms. In “CRISPR Combo”, Beisel will study the natural properties of CRISPR and how these DNA elements can be exploited to better interrogate pathogens and how they affect their host.

Beisel acquired further funding of 1.8 million euros from the transnational ERA-Net (JPI-AMR) leading a group of five principal investigators from three different countries to develop CRISPR-Cas approaches against the respiratory pathogen *Klebsiella pneumoniae,* and another half a million euros from the US Agency for Defense Research Projects Development (DARPA) for new tools for monitoring and controlling technologies that can alter genetic information.

AWARDS AND POSITIONS

Jörg Vogel received one of two Feldberg Prizes 2019 in the amount of 12,500 euros for his contribution to German-British exchange in the life sciences; he gave the Feldberg-lecture at the Laboratory of Molecular Biology in Cambridge. Vogel was also elected as a member to the “Board of Directors” of the RNA Society. He was also re-elected for a further two years as Chairman of the DFG Committee on Scientific Instrumentation and Information Technology.

Chase Beisel became a member of the Technology Development Committee of the HZI.

HIRI director Jörg Vogel. Image by Mario Schmitt, ©HIRI / HZI

CONFERENCES

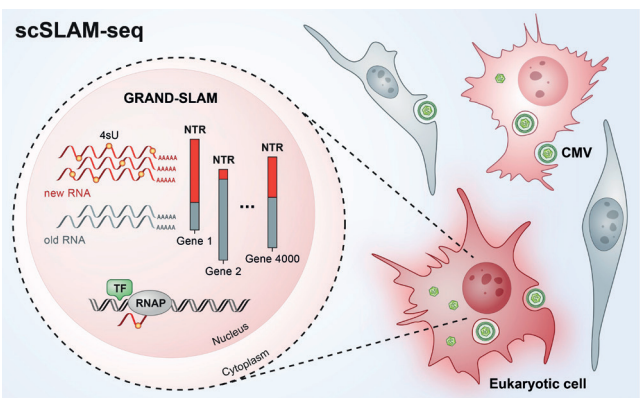
HIRI group leader Neva Caliskan during a presentation. © HIRI / HZI

HIRI group leaders presented at 58 scientific events worldwide, including 45 times as invited speakers. The HIRI organized and hosted the “International Conference on CRISPR Technologies - CRISPR 2019” and the workshop “Single-cell Biology of Infection” in Würzburg, Germany, and was involved in the organization of two other international events, the EMBO Symposium “The Non-Coding Genome” (EMBL, Heidelberg, Germany) and the conference “Cold Spring Harbor Asia Bacterial Infection and Host Defense” (Suzhou, China).

PUBLICATIONS

20 articles are published by HIRI scientist, six of which appear in particularly high-profile international journals. In *Nature*, Emmanuel Saliba and HIRI-affiliated virologist Lars Dölken (JMU) described scSLAM-seq, which for the first time enables researchers to temporally observe the synthesis of new cellular RNA in individual cells.

In *Nature Communications*, Chase Beisel and his postdoc Chunyu Liao described their newly developed technique that makes it much easier to edit multiple genes at one time with CRISPR technologies, facilitating their broad use in basic research and human therapeutics. The technique also allowed them to learn more about the bacterial defense that gave rise to these technologies.



Graphical abstract of the scSLAM-seq publication by Emmanuel Saliba and Lars Dölken in *Nature*. Figure: Sandy Pernitzsch, © HIRI / HZI

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EVENTS

At the HIRI New Year's reception, the challenge cup "Fostering the HIRI Spirit" was awarded to Hilde Merkert. In May, HIRI had the honour of hosting the biannual meetings of the HZI's supervisory board and scientific committee in Würzburg. Shortly after, our group leaders packed their bags and retreated for two days into the Palatinate forest.

In early July, the HIRI staff went on a culturally oriented excursion to see the German-English performance of "Black Rider" at the Mainfranken Theater in Würzburg. The annual joint summer party of IMIB, RVZ and HIRI followed on July 4th, with Otmar Wiestler, the President of the Helmholtz Association, among the guests.

The HIRI at the performance of "Black Rider" at the Mainfranken Theater in Würzburg. © HIRI / HZI

Shortly before the end of the year, on November 25th, we held the first HIRI Science Slam, sponsored by the company Lexogen. The participants were coached by the winner of the science slam series "Fame Lab", Veli Uslu. From an exciting line up, the winner of the Science Slam was PhD student Anuja Kibe from Neva Caliskan's research group. Congratulations!

As always, the successful end of the year was marked by the joint Christmas party organized by HIRI and the Institute for Molecular Infection Biology (IMIB) in building D15 on December 12th.

OUTREACH

In February, the official HIRI website www.helmholtz-hiri.de went online, replacing the preliminary website www.hiri-on-air.de. In April, Jörg Vogel spoke at the ARD Campus Talks about "How we can use the bacteria in our intestines to fight disease". At the beginning of the year, HIRI received a high-ranking visitor, State Secretary Roland Weigert (Bavarian State Ministry of Economic Affairs, Regional Development and Energy). In July, we welcomed Helmholtz President Otmar Wiestler for a personal impression of "his" institute and a bratwurst at the institute's summer party. Later in July, we had the pleasure of welcoming newly elected MdL Patrick Friedl at HIRI. Finally, in October, we were visited by the President of the District Government of Lower Franconia, Dr Eugen Ehmann, and presented our institute and our research at the "Nature Careers" fair in London.

Otmar Wiestler and Jörg Vogel at the summer party 2019. © HIRI / HZI

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Many thanks to everyone who helped to make 2019 a successful year for HIRI.
We are already looking forward to 2020!