

## ANNUAL REVIEW 2017

It all started in May 2017: The new Helmholtz Institute for RNA-based Infection Research became reality. The first research groups started their work in the fields “RNA-Biology of Bacterial Infections” and “Single Cell Analysis”. Our reputation reached several international scientists who will strengthen the institute with their research groups in the coming year.

### FOUNDATION

With the “Helmholtz Institute for RNA-based Infection Research” (HIRI) in Würzburg, both parent institutions, the Helmholtz Centre for Infection Research (HZI) and the Julius-Maximilians-University of Würzburg (JMU), have established a research institution with an internationally unique orientation. The aim of HIRI is to combat infectious diseases by exploiting the potential of ribonucleic acid (RNA) as a diagnostic, target, and drug.

At the beginning of May 2017, the new Helmholtz Institute was officially presented to the Bavarian State Parliament. On May 24<sup>th</sup>, the founding agreement was approved by the stakeholders and the cooperation agreement between JMU and HZI was signed. The foundation of HIRI was then celebrated with a ceremony in the Würzburg Residence with representatives from politics, science, and industry.



Ilse Aigner (m.), Bavarian State Minister of Economic Affairs and Media, Energy and Technology, symbolically hands over the start-up financing for the HIRI provided by the State of Bavaria to HIRI Director Prof Jörg Vogel (l.) and Prof Dirk Heinz, Scientific Director of the HZI (r.) © Rudi Merkl

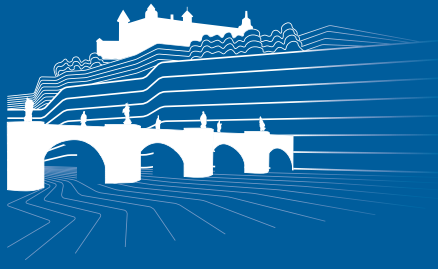
### PERSONNEL



Dr Antoine-Emmanuel Saliba, head of the single cell analysis group at HIRI. © HIRI

HIRI director Prof Jörg Vogel and group leader Dr Antoine-Emmanuel Saliba established their research groups at the institute’s foundation. The first HIRI doctoral students, Annika Schulz and Ehsan Vafadarnejad, started on July 1<sup>st</sup>, 2017. A two-day selection symposium was held in July in order to quickly staff other HIRI working groups. Subsequently, Prof Chase Beisel, North Carolina State University (USA), was appointed to a W2 professorship for RNA-based Infection Research, and four junior professorships for RNA-based Infection Research were offered to Dr Lars Barquist, JMU Würzburg, Dr Neva Caliskan, Max Planck Institute for Biophysical Chemistry Göttingen, Dr Redmond Smyth, Institut de Biologie Moléculaire et Cellulaire, Strasbourg (France) and Dr Alexander Westermann, JMU Würzburg. In addition to his appointment as W1 professor, Redmond Smyth has been selected for a Helmholtz Young Investigator Group by an independent review panel of the Helmholtz Association in Berlin on September 5<sup>th</sup>, 2017.

With Alice Hohn as head of administration and Dr Nina Littwin as scientific coordinator, the administration department quickly took its first steps and grew to a total of five employees in the course of the year. By year’s end, the institute already had 12 employees (see next page).



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The HIRI team in the summer of 2017 (from left to right): HIRI director Prof Jörg Vogel, PhD student Ehsan Vafadarnejad, PhD student Annika Schulz, scientific coordinator Dr Nina Littwin, head of administration Alice Hohn, administrative assistant Christoph Kosche, facility technician Sebastian Stockmann, group leader Dr Antoine-Emmanuel Saliba, IT and laboratory manager Hilde Merkert. © HIRI / Monika Meece

## NEW BUILDING



A new building will be constructed on the campus of the University Hospital Würzburg for HIRI, and will be home to more than 100 scientists in the future. The Free State of Bavaria is providing 30 million euros for the construction. Regular planning discussions between all parties involved in the construction started at the beginning of the year. The most important result of the third meeting in July 2017 was the definition of the construction site on the campus of the University Hospital of Würzburg. Afterwards, a planning competition for the architectural design of the new HIRI was launched. Until the new building is ready, HIRI will have 1,500 square meters of space at the JMU Würzburg at its disposal.

## SEMINARS

HIRI scientists were integrated into the lecture series of the JMU. At the same time, the establishment of an RNA Faculty was initiated, which is intended to bring together leading scientists in the field of RNA research and infection biology in Würzburg. The RNA Faculty will be the central organ of the cross-institutional RNA seminar series planned by HIRI that will start in 2018.

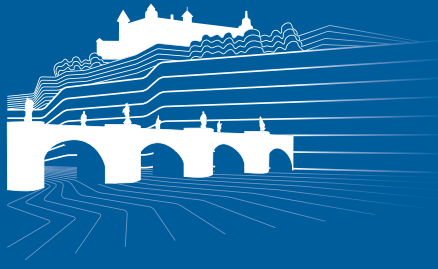
## INFRASTRUCTURE

High-throughput RNA sequencing is a core technology at HIRI. Therefore, one of the first acquisitions was an Illumina NovaSeq6000 system for about 1 million euros. The new system enables HIRI scientists and their colleagues at the HZI to share the analyses, which are up to four times faster and considerably more economical.

Shortly after the founding of the institute, the DropSeq Bio-Rad ddSEQ™ single cell sequencing system was introduced at HIRI in Würzburg. This microfluidic system analyzes nanoliter-sized droplets for single cell sequencing and enables monitoring of thousands of genes per cell, strengthening the important research area of single cell analysis at HIRI.



The installation of the Illumina NovaSeq6000 creates synergies between the new HIRI in Würzburg and its parent center HZI in Braunschweig. © HIRI / Illumina Inc.



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### RESEARCH FUNDING

With the call for “HIRI Seed Grant Projects” starting July 1<sup>st</sup>, 2017, collaboration between HIRI scientists and the HZI, the JMU and the University Hospital of Würzburg (UKW) was accelerated. Joint research projects at the interface of RNA and infection research have been supported with up to 100,000 euros each. A total of 22 projects were selected, for which HIRI provided 1.9 million euros from its own budget. The first results of a joint seed grant project of HIRI, HZI and JMU was submitted to the journal *Frontiers in Immunology* under the title “Tolerogenic Transcriptional Signatures of Steady-State and Pathogen-Induced Dendritic Cells” by the end of the year.



In its first year of existence, HIRI was also engaged outside the Helmholtz Association. In January 2017, for example, Jörg Vogel took over the chairmanship of the German Research Foundation (DFG) Equipment Committee.

### AWARDS AND POSITIONS

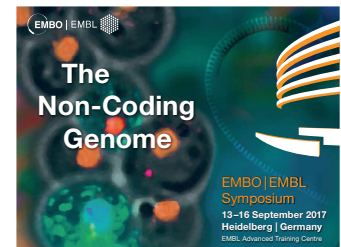


DFG President Prof Peter Strohschneider hands over the certificate for the Gottfried Wilhelm Leibniz Prize to laureate Prof Jörg Vogel.  
© DFG / David Ausserhofer

Jörg Vogel was honored with the renowned Gottfried Wilhelm Leibniz Prize of the German Research Foundation (DFG). He received the award, endowed with 2.5 million euros in research funding, for his groundbreaking work on understanding regulatory RNA molecules in infection biology.

### CONFERENCES

As member of the organizing committee, Antoine-Emmanuel Saliba co-hosted the two-day congress “Next Generation Sequencing & Single Cell Analysis”, which took place in London (UK) in November 2017. Together with Elisa Izaurralde, David Bartel and John Rinn, Jörg Vogel organized the EMBO|EMBL Symposium “The Non-Coding Genome” which took place in Heidelberg in September.

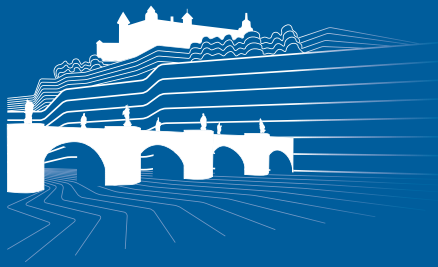


In total, HIRI group leaders represented the institute at 37 scientific events in 2017, 21 times as invited speakers.

### PUBLICATIONS

24 publications appeared at the HIRI in 2017, seven of them in high impact journals.

Jörg Vogel and Stan Gorski, together with CRISPR researcher Jennifer Doudna, published a review article in *Nature Reviews Molecular Cell Biology* about a mechanism used by regulatory RNAs to recognize their target segments.



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Together with an international team of experts, Jörg Vogel described a novel approach to mapping the sites of a central cellular RNA cleavage enzyme (RNase E) in bacteria, published in *Molecular Cell*. His group also published the first mechanistic papers on the recently described global RNA binding protein ProQ in the *EMBO Journal*.

In their article “The primary transcriptome of *Neisseria meningitidis* and its interaction with the RNA chaperone Hfq” in the journal *Nucleic Acids Research*, colleagues from different institutes in Würzburg shed light on the complex RNA-based regulatory network of *Neisseria meningitidis*, a pathogen that can cause life-threatening meningitis and blood poisoning.

### OUTREACH & EVENTS

The opportunities and risks of genome editing are an increasing focus of public discussion. In Leopoldina’s “Unterhausdebatte” in February, Jörg Vogel and other scientists answered questions on the topic “Specifically altering the genome - how far can genome surgery go?” for 28 invited journalists. In November, while being invited as a speaker in the Burkhardushaus of the Würzburg Cathedral School, he answered the question “What do you think about genome editing?” and in December he discussed this topic in front of the camera with representatives from science and society in the DFG’s talk series “Science On with Cécile Schortmann”.



Scientists discuss the topic of genome analysis with the press.  
© Leopoldina / Christof Rieken

### VISITS



Entrepreneur Baldwin Knauf during his visit at the HIRI.  
© HIRI / Mario Schmitt

At the beginning of the year Ilse Aigner, Bavarian State Minister of Economic Affairs and Media, Energy and Technology, honored us with a visit. In summer, philanthropist Baldwin Knauf visited us and took part in the annual cross-institutional summer party.

The Scientific Director of the HIRI mother centre HZI, Professor Dirk Heinz, got a personal tour of the young Helmholtz Institute. Professor Dominic Grün from the Max Planck Institute of Immunobiology and Epigenetics (Freiburg) gave a talk for the interested staff of HIRI, the Institute of Molecular Infection Biology (IMIB) and surrounding research institutions. Shortly afterwards, we presented the new Helmholtz Institute in Würzburg to a delegation from the ruling Bavarian political party, the CSU, and explained what makes the research area of RNA-based infection research so unique and promising.

**None of this would have been possible without the support of the wider scientific community. Our heartfelt thanks go to all those who have contributed to our success and to all those who are now actively shaping the new institute. Exciting times lie ahead!**