SPOTLIGHT ON IMMUNOLOGY

Stopping a pandemic in its tracks

When a pandemic looks likely to break out, scientists across multiple disciplines must cooperate to limit its spread.

"Every day we see patients, and we see families that lose people. This is not about my career, this is about the patient."

Helen Sabzevari, Senior Vice President of Immuno-Oncology, EMD-Serono

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When a pandemic threatens, scientists play a vital role in influencing protection policies.

SINCE APRIL 2012, seventeen people around the world have been infected with a virus that has baffled scientists, public health officials and governments. Initial cases in the Middle-East were reported to the World Health Organisation's Global Outbreak Alert and Response Network, set up to detect epidemics and other public health emergencies. The type of virus is known, a novel coronavirus, a species of the virus behind the common cold, but its origins are still a mystery. This new virus is currently moving slowly, but it was a coronavirus that caused the 2003 Severe Acute Respiratory Syndrome (SARS) pandemic which killed 774 people, so scientists who work on controlling the spread of new infections are on full alert.

One of them is Eric Snijder, Professor of Molecular Virology at Leiden University Medical Center, in the Netherlands, who has been studying coronaviruses for more than 25 years. In October 2012, his team identified the genome properties of this emerging strain. It is now collaborating with an international group of labs in the hope of identifying compounds that may inhibit the virus's replication. The collaboration is part of the European project SILVER, a drug design program to tackle emerging diseases caused by RNA viruses such as the new coronavirus.

The discovery of a universal flu vaccine could be on the cards.

Outbreak alert

Snijder's work represents the initial action taken when a new infection emerges. Be it a new subtype of influenza, such as H1N1 ('swine flu'), or a new coronavirus, understanding the biology of the virus and estimating the threat it poses is crucial. But the first step is to find the virus, using global monitoring and surveillance systems.

The WHO response network consists of 140 laboratories in 110 UN member states recognized as National Influenza Centres. John McCauley is Director of the WHO Influenza Centre at the National Institute for Medical Research in London, one of six that regularly analyses significant flu viruses seen in the population as well as other emerging viruses which may be cause for concern. If the prevalence of new influenza strains increases, "it might indicate that the world is at increased risk of an influenza epidemic," says McCauley. Global and domestic surveillance in the US is carried out by scientists at the Centers for Disease Control and Prevention (CDC), whose labs in Atlanta are part of the WHO network. Constant communication is needed between centers to identify whether viruses recorded in different countries share characteristics.

Once a threat has been identified, potential treatments must be trialed quickly and a pandemic preparedness plan put into action. This is part of the remit of Anthony Fauci, Director of the National Institute of Allergy and Infectious Disease (NIAID) in Bethesda, Maryland. "We need to understand the pathogenesis of the virus and how it may mutate and become highly transmissible to cause a pandemic," says Fauci. His lab then starts testing drugs and vaccines to stop the virus in its tracks. "We collaborate [with industry] and run clinical trials for new vaccines to determine the right dose, if it's safe, if it's effective, especially in vulnerable members of the population," he says.

"In 2009, as soon as H1N1 became clear, we immediately went into action to develop a vaccine and tested the virus for sensitivity to drugs we already have such as Tamiflu – fortunately, it was [sensitive]," he says. Identifying effective drugs helps 'buy time' from a public health perspective, as developing a vaccine currently takes about six months.

During this waiting game, another field – infectious disease modeling – comes into play, to predict and mitigate the extent to which a virus will spread.

Predicting possibilities

John Edmunds is dean of the Faculty of Epidemiology and Population Health at the London School of Hygiene and Tropical Medicine, and in his former role running

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the modeling and economics unit at the UK Health Protection Agency (HPA) was among those responsible for modeling outcomes for the 2009 H1N1 pandemic. "We run through different control scenarios, such as the use of vaccines or anti-virals, and see what may happen to the epidemic," says Edmunds. The aim is to gauge the trajectory of an infection and the effect of any actions, including economical and political control measures such as travel restrictions and school closures.

Models use characteristics like pathogenicity of the virus (how likely it is to cause an infection) to predict its spread, but these days can also use current information on cases and timings to model epidemics in real-time, a technique known as 'nowcasting'.

"We use many different data sources and patch them together to get a glimpse of how many cases there really have been," Edmunds says. For those wanting to get into modeling, it helps to have a diverse skill set. "You need a range of people and skills to handle this. You need to understand biology, statistics, computer programming, economics and bioinformatics."

An ability to work effectively with others is also vital, says Edmunds, who sits on the Scientific Pandemic Influenza (SPI) committee alongside other modelers, virologists, and experts in risk management, behavioural sciences and diagnostics. Together, they feed information to the government to guide policy and mobilize resources.

Manufacturing the FluMist influenza vaccine at MedImmune.

Policy pressures

Influencing policy decisions is not a role which always sits well with scientists, especially under the time pressures of dealing with the spread of dangerous viruses. "Anyone that can provide clear information and communicate the risk has the power to lead a response," says David Heymann, Head of the Centre for Global Health Security at Chatham House and Chair of the UK Health Protection Agency.

A particularly contentious problem is prioritising who should receive medicines first, including chemoprophylaxis – where drugs are used before infection to avoid people getting the disease. "During H1N1, the UK Department of Health and the HPA made the decision to treat contacts of patients prophylactically to slow down the spread of the virus," says Heymann.

Despite the time needed for their development, the most desirable response to every pandemic is a vaccine. This involves collaboration between government-run organizations and industry. Kanta Subbarao, who leads the emerging respiratory viruses section at the NIH's Laboratory of Infectious Diseases, in Bethesda, collaborates with biotech company MedImmune to develop vaccines against influenza strains that show pandemic potential. "We share our data in presentations and publications – this becomes part of the body of information that informs further decision making in the government and pharma," Subbarao says. Pharmaceutical companies instigate their own pandemic preparedness plans and played an integral role during the H1N1 pandemic. For instance, Glaxosmithkline set aside two million eggs for vaccine production, as hen eggs are traditionally used to incubate the virus.

Dangerous encounters

Working with highly contagious pathogens comes with risk. "We have to work in a way that minimizes the risk of infection, by using high containment conditions such as safety cabinets with gloved ports, negative pressure and use of filters to trap viruses," McCauley says.

This type of research is also extremely controversial, and the potential for viruses to become transmissible from animals to humans in the future – the study of which is seen as an important part of pandemic preparedness – notoriously led to a year-long moratorium on this type of research from January 2012. These issues are among those considered by the newly-established Centre for Global Health Policy at the University of Sussex, UK. "Safeguards should be in place to minimize the risk of accidental or deliberate misuse of research on deadly strains of influenza viruses," says center director Stefan Elbe.

Universal ambitions

For many immunologists working to reduce pandemics, the ultimate goal is a universal flu vaccine. "We want to make a vaccine that produces a response to a section of the influenza virus that doesn't change from pandemic to pandemic," says Fauci. Such a vaccine, if administered every 5 to 8 years throughout the population, could prevent a pandemic altogether. Of course, it won't tackle the problem of emerging infections such as SARS and the current coronavirus, but it's a step in the right direction to fight influenza which has seen the biggest pandemics to date. "It's going to take several years to get there," says Fauci, "but we're starting to see the first glimmers of success."

Nature editorial staff have no responsibility for content

Vaccines for cancer

Dr Helen Sabzevari has been in the field of immunotherapy since its infancy, working to harness the body's own immune system to treat cancer. As she was doing her first postdoc, at Scripps Research Institute, in San Diego, Sabzevari realised that there was a disconnect between scientists working in her own field of cancer immunotherapy, and those working on auto-immunity diseases. "Normally, these two diseases are opposite sides of the coin," she says. "Autoimmunity is over-activity of the function of immune cells but with cancer there is a quiescence of the immune system. In my opinion it was really important to understand both sides."

Sabzevari ignored the advice of mentors, who had already seen her career progress in immunotherapy, and decided on a senior postdoc in the field of autoimmunity. In doing so, she hoped she might find a way to use the mechanisms that cause the immune system to over-react in autoimmune diseases to kick-start the same cells, which don't respond to cancer.

The decision paid off. Sabzevari spent almost 10 years researching cancer vaccines at the National Institutes of Health, before moving to pharma company EMD-Serono where she leads their immuno-oncolgy research. Using the body's own defences to attack cancer cells should lead to less toxic treatments for patients, says Sabzevari. "With some of the advances that have been made, the patient can remain on the treatment for much longer periods of time with a better lifestyle."

Sabzevari is also keen to build bridges between academia and industry to hasten the availability of possible treatments. To this end she has set up a programme at EMD-Serono which allows postdocs to spend two or three years in industry before returning to academia if they wish.

Ultimately, for Sabzevari and her colleagues, the aim is to see their findings get to the clinic as quickly as possible. "Every day we see patients, and we see families that lose people," she says. "This is not about me, this is not about my career, this is about the patient."

Endowed Chair in Microbiology and Immunology

The Department of Integrative Medical Sciences at the Northeast Ohio Medical University (NEOMED) invites applications to fill the newly created Watanakunakorn Chair in Microbiology and Immunology. We are especially interested in applicants whose research programs will complement existing departmental strengths in cardiovascular disease, regenerative medicine, lipid metabolism, liver biology, inflammation and viral pathogenesis as well as enhance and expand existing ties with NEOMED's clinical partners in Northeast Ohio. Applicants will be expected to have an internationally recognized research program in basic, translational or clinical microbiology/immunology/inflammation/infectious disease research; a history of sustained extramural funding; and a commitment to academic excellence in medical and graduate education. Position requirements include a Doctorate (PhD, MD, DVM, or equivalent), a successful history as Principal Investigator of federal research grants, and Associate or Professor level qualifications at an academic medical institution or equivalent. This position will provide the successful candidate with significant laboratory space and research resources, and the opportunity to grow their research at NEOMED through the recruitment of additional junior faculty.

Qualified Candidates should send their CVs along with the names of three references to: **Dr. William P. Lynch, Search Committee Chair, c/o Ms. Karen J. Greene (kjg@neomed.edu).** Applications will be reviewed beginning **May 1, 2013** and continue until a suitable candidate is recruited.

NEOMED is a thriving freestanding Community-based Medical University committed to excellence in medical education, research, and community outreach. The institution is currently in an active growth phase, which includes new state of the art research facilities and expansion of the comparative medicine unit. Uniquely, NEOMED is located in a semi-rural setting with ready access to outstanding urban, suburban and rural cultural, community and recreational activities, along with a very low cost of living index, maximizing quality of life issues.

NEOMED encourages and welcomes diversity in the workplace and is an Equal Opportunity Employer

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University of Connecticut Health Center

Tenure-Track Immunology Faculty Position

The Department of Immunology at the University of Connecticut Health Center seeks an outstanding investigator for a tenure-track position at the Assistant/Associate/Full Professor level. Although all areas of immunology will be considered, we are particularly interested in individuals using molecular, cellular and translational approaches to study immune system function in vivo. Areas of priority include but are not limited to mucosal immunity including the microbiome, innate immunity, signal transduction and transcriptional control, and dendritic cell biology. The new hire will participate in a vibrant Ph.D. training program and have access to a growing translational research community. Salary and start-up funds are highly competitive and outstanding core facilities are available. Applicants must have a Ph.D. or M.D./Ph.D. and for senior appointments a history of sustained extramural funding and a high impact publication record. In addition to the beauty of the picturesque New England countryside, the Hartford area offers a vibrant arts and cultural scene and an exceptional outdoor sports environment.

Applicants should apply at **https://jobs.uchc.edu** search number 2012-067 and submit curriculum vitae, a two-page summary of research interests and the names of three references. Information may also be submitted to Dr. Leo Lefrançois, Ph.D., Chairman, Department of Immunology, UConn Health Center, Farmington, CT, 06030. Email: **immunology@uchc.edu**. For further information on UCHC immunology, please visit **immune.uchc.edu**.

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VANDERBILT UNIVERSITY MEDICAL CENTER

FACULTY POSITION IN IMMUNOLOGY
Department of Pathology, Microbiology and Immunology
Program in Immunology
Vanderbilt University School of Medicine

The Department of Pathology, Microbiology and Immunology at Vanderbilt University School of Medicine invites applications for a tenure-track faculty position at the Assistant Professor level (PhD, MD, MD/PhD, or equivalents). Within the search focus on immunology, areas of particular interest include but are not limited to immune responses to microbes and the interplay between immune system and major inflammation-related diseases such as cancer, atherosclerosis, and metabolic disorders. Successful candidates will be expected to establish and maintain an independent research program and participate in teaching of graduate and medical students. Candidates should have substantial post-graduate training highlighted by peer-reviewed publications that demonstrate research productivity and excellence.

Vanderbilt University Medical Center, located on the Vanderbilt University campus, is home to internationally recognized programs in proteomics, structural biology, imaging science, bioinformatics, pharmacology, drug discovery, inflammation, and vaccines. The School consistently ranks in the Top 20 US Medical Schools and provides outstanding opportunities for scholarship and cross-disciplinary collaborations.

The Vanderbilt University campus is a National Arboretum located in the heart of Nashville, the capital of Tennessee. Known as "Music City USA", Nashville is home to professional sports teams, the Nashville Symphony, the Frist Center for the Visual Arts, and numerous outdoors activities; it is a great place to live and raise a family while doing ground-breaking research and teaching outstanding students at all levels.

Applicants should send a curriculum vitae, a statement of current and future research interests, and three letters of recommendation to: Search Committee, c/o Helen Chomicki, Dept. of Pathology, Microbiology and Immunology, Vanderbilt University School of Medicine, Room A-5301, Medical Center North, 1161 21st Ave. S., Nashville, TN 37232. Inquiries, applications, and recommendation letters can be directed via email to **Helen.Chomicki@vanderbilt.edu.**

Vanderbilt University is an Affirmative Action/Equal Opportunity Employer. Women and minority candidates are encouraged to apply.

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MEDICAL RESEARCH COUNCIL UNIT: THE GAMBIA POST-DOCTORAL IMMUNOLOGIST

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For 60 years now, our laboratories in The Gambia have been carrying out internationally competitive research and have established ourselves as the leading research centre in sub-Saharan Africa. Perhaps more importantly, we continue to push forward into new and challenging areas. We have developed an exciting new research agenda to reflect changes in national and global health priorities. Our new science portfolio is organised around three themes: Child Survival, Disease Control & Elimination and Vaccination.

We are seeking a skilled post-doctoral Immunologist to support a number of vaccine trials (malaria and polio in the first instance) employing novel immunological techniques to measure vaccine immunogenicity. The post-holder may also support other infectious disease and vaccine immunology research that is ongoing in the Vaccinology Theme.

You will have a PhD in Immunology with extensive hands-on laboratory practical expertise including state of the art flow-cytometry, cytokine analysis by flow cytometry and multi-analyte (Luminex) analysis, ELISPOTS & ELISA. In addition, you will have excellent written and spoken English, proven staff management experience, excellent interpersonal and verbal/written communication skills with the ability to meet tight deadlines.

Experience in the development of novel assays & human immunology, clinical trials, interest in infectious disease and vaccine immunology, strategic planning, risk management, experience working in health research and a significant publication record in peer-reviewed journals would be an advantage.

The appointment will be for 2 years and is subject to a probationary period of 6 months.

An attractive salary will be paid in MRC's Band 3/4 dependent on qualifications and experience. Generous overseas allowances, furnished accommodation, flights and other benefits apply for displaced staff.

If you are interested and have the skills and abilities for this position please contact the Human Resources Office (hr@mrc.gm) for an application form and a copy of the job description and person specification.

Informal enquiries from suitably qualified individuals would be welcome. Please contact Dr Ed Clarke, Head of Infant Immunology, in the first instance (eclarke@mrc.gm)

Completed application forms together with a detailed CV and a covering letter should be sent to hr@mrc.gm quoting reference GAM 11.

Closing date: 14th May 2013

For further information about MRC UK visit www.mrc.ac.uk and for MRC Gambia www.mrc.gm

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'Leading Science for Better Health'

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MAYO CLINIC

Faculty position in Cancer Immunology

Heal the sick, advance the science, share the knowledge.

Mayo Clinic in Rochester, MN is seeking a Cancer Immunology and Immunotherapy Researcher who will be expected to maintain a nationally/internationally recognized, extramurally funded program of research within the Department of Immunology, a basic science department within the College of Medicine, and be an active participant in the Mayo Clinic Cancer Center.

The Mayo Clinic is a collaborative environment, bringing researchers and clinicians together, to bring cutting-edge research from the bench to the bedside. Resources available at the Mayo Clinic include NIH-funded CTSA and T32 grants, NCI-funded Comprehensive Cancer Center and several active, funded SPOREs in Ovarian Cancer, Breast Cancer, Pancreatic Cancer, Brain Cancer and Lymphoma.

A successful candidate will include doctoral degree in biomedical sciences (MD and/or PhD), national recognition and experience in the field and a strong track record of publication. Preference will be given to applicants with established research programs in any aspect of cancer immunology and immunotherapy, but individuals with active programs involving mobilizing the immune response in cancer are particularly encouraged to apply.

Mayo Clinic is an excellent choice for the candidate who is seeking a career in a world-class academic medical center that is consistently recognized by *U.S. News and World Report* as one of America's "Best Hospitals." Mayo Clinic's multidisciplinary group practice focuses on providing high-quality, compassionate medical care with a primary value that "the needs of the patient come first." Mayo Clinic is a nonprofit organization with approximately 3,800 physicians and scientists across all locations working in a unique environment that brings together the best in patient care, ground breaking research and innovative medical and graduate education.

Mayo Clinic offers a highly competitive compensation package, which includes exceptional benefits, and has been recognized by *Fortune* magazine as one of the "100 Best Companies to Work For."

To apply and learn more, please visit: **www.mayoclinic.org/scientist-jobs/** and reference job posting **#22631BR**. Applicants should include a CV and a statement of research interests. Specific questions related to the job posting should be directed to:

Virginia Shapiro, Ph.D.
Immunology
Mayo Clinic
Email: helgren.brent@mayo.edu

Mayo Clinic is an affirmative action and equal opportunity employer. Post-offer/pre-employment screening is required.

NW235260R

Schulich MEDICINE & DENTISTRY

Call for Applications

Chair, Department of Microbiology & Immunology

Western

The Schulich School of Medicine & Dentistry, at Western University, is inviting applications for the position of Chair in the Department of Microbiology & Immunology.

Microbiology & Immunology is a vibrant department with strengths in basic and clinical research in host pathogen relationships centered on studies of infectious disease, inflammation, cancer and the host microbiome. The Department has approximately 40,000 square feet of laboratory space and access to many core facilities located at the Schulich School of Medicine & Dentistry, and at the Robarts Research Institute. The department has a strong undergraduate program including Honours programs in Microbiology & Immunology and Biochemistry of Infection and Immunity. The Department has an innovative graduate program consisting of both basic and clinically relevant aspects of microbiology, immunology and cancer. In addition, the Department provides teaching to medical, dental, science and health science students through undergraduate programs in the Schulich School of Medicine & Dentistry and the Faculties of Science and Health Sciences. The department plays an integral role in the Centre for Human Immunology, a city-wide initiative.

The successful candidate should have a demonstrated track record of research excellence and have a reputation for effective interpersonal, administrative and leadership skills. The new Chair will be expected to support the research, educational and interdisciplinary initiatives of the Department, to help maintain the positive forward momentum of the Department and to develop new initiatives in research/scholarship. The successful candidate will be expected to strengthen bridges across both clinical and basic science departments and Institutes with a view towards developing translational opportunities. The successful candidate must have a MD, DDS, PhD or equivalent, and would receive a tenured academic appointment at the level of associate or full professor, as appropriate to their record of accomplishment in teaching and research. Candidates with a research program complementing existing research strengths are particularly encouraged to apply. The position of Chair is for a five year term, renewable.

Details about the Department of Microbiology & Immunology can be found at http://www.uwo.ca/mni/; the Schulich School of Medicine & Dentistry at www.schulich.uwo.ca; and Western University at www.uwo.ca.

Interested candidates should submit a CV outlining their research, teaching, and administrative experience and interests, including future directions, together with the names and addresses of three referees to:

Dr. Michael Strong, Dean
Schulich School of Medicine & Dentistry
Room 3701A, Clinical Skills Building, Western University
London, Ontario N6A 5C1
FAX: (519) 850-2357
selection.committee@schulich.uwo.ca

Applications will be accepted until the position is filled. Review of applicants will begin after June 1, 2013.

Positions are subject to budget approval. Applicants should have fluent written and oral communication skills in English. All qualified candidates are encouraged to apply; however, Canadians and permanent residents will be given priority. The University of Western Ontario is committed to employment equity and welcomes applications from all qualified women and men, including visible minorities, aboriginal people and persons with disabilities.

NW236073R

78th Cold Spring Harbor Symposium on Quantitative Biology

Immunity & Tolerance

May 29 - June 3, 2013

Organized by

Michel Nussenzweig
Anne O'Garra
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Topics

- Stem cells and cell fate decisions
- Regulation of immune cell development
- Antigen receptor gene assembly and modification
- Signal transduction
- Regulation of lymphocyte function
- Innate immune response and inflammation
- Adaptive immunity
- Mucosal immunity
- Organ specific immunity
- Immune regulation and tolerance
- Autoimmunity and allergy
- Immunity and cancer
- Pathogen-immune system interactions
- Vaccine development
- Novel strategies to engineer/harness immunity

Speakers

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Shizuo Akira
James Allison
Frederick Alt
David Baltimore
Yasmine Belkaid
Zami Ben-Sasson
Albert Bendelac
Christophe Benoist
Pamela Bjorkman
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Craig Thompson
Carola Vinuesa
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Harald von Boehmer
Bruce Walker
Hedda Wardemann
Art Weiss
Irving Weissman
Wayne Yokoyama

Other 2013 Meetings

www.cshl.edu/meetings

Wiring the Brain July 18 - 22 Ed Bullmore, Z. Josh Huang, Helen Mayberg, Kevin Mitchell
Metabolic Signaling & Disease: From Cell to Organism August 13 - 17 Daniel Kelly, Mitchell Lazar, Susanne Mandrup
Eukaryotic mRNA Processing August 20 - 24 Tom Blumenthal, Kristen Lynch, Karla Neugebauer
Mechanisms of Eukaryotic Transcription August 27 - 31 Stephen Buratowski, Katherine Jones, John Lis
Behavior & Neurogenetics of Nonhuman Primates September 6 - 9 Jeffrey Rogers, Nelson Freimer
Eukaryotic DNA Replication & Genome Maintenance September 9 - 13 Anindya Dutta, Joachim Li, Johannes Walter
Microbial Pathogenesis & Host Response September 17 - 21 Andrew Camilli, Lalita Ramakrishnan, Malcolm Whiteway
Stem Cell Biology September 24 - 28 Konrad Hochedlinger, Fiona Watt, Ting Xie
Neurobiology of *Drosophila* October 1 - 5 Thomas Clandinin, Linda Restifo
Cell Death October 8 - 12 Douglas Green, Sally Kornbluth, Scott Lowe
Genome Informatics October 30 - November 2 Jennifer Harrow, Michael Schatz, James Taylor
Cell Biology of Yeasts November 5 - 9 Martha Cyert, Daniel Lew, Kenneth Sawin
Personal Genomes & Pharmacogenomics November 13 - 16 Ann Daly, Nicholas Katsanis, Deanna Kroetz, Jim Lupski
Harnessing Immunity to Prevent & Treat Disease November 20 - 23 Susan Kaech, Robert Seder, Susan Swain
Plant Genomes & Biotechnology: From Genes to Networks December 4 - 7 Mary Lou Guerinot, Todd Mockler, Detlef Weigel
Rat Genomics & Models December 11 - 14 Edwin Cuppen, Aron Geurts, Michael Gould, Bina Joe

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