ISAR News
Newsletter of the International Society for Antiviral Research
Editor Anthony Vere Hodge Guest editor Luis M Schang

Welcome to the 30th ICAR Atlanta, GA, USA

IN THIS ISSUE

ISAR PRESIDENT'S MESSAGE (José Esté)

It is with great pleasure that I salute all ISAR members and friends in this new issue of Antiviral News.

As the 30th International Conference on Antiviral Research (ICAR) in Atlanta draws nearer, the conference program begins to take full shape. ICAR was designed specifically to advance scientific knowledge, and promote interdisciplinary and international cooperation on antiviral research.

This year represents the 30th annual meeting of ISAR that demonstrates its long-term commitment to the founding objectives of the society: to assemble basic scientists, clinicians and students to promote scientific excellence and scientific knowledge on antiviral research and antiviral drug and vaccine development and to promote cooperation of basic biologists, medicinal chemists, pharmacologists, and clinicians to drive innovative solutions to the challenges posed by viral infections. The meeting will serve to support the education and professional development of students, young investigators, researchers from developing countries and those who have been traditionally underrepresented in science.

This year ISAR will continue its efforts to provide financial support to students and postdocs through its merit travel awards, and help those from faraway places reach Atlanta through Travel support.

We are most grateful to all 30th ICAR Corporate and Academic Sponsors. At the time of print of this issue, the already confirmed sponsors are: **PLATINUM**: Gilead Sciences. **GOLD**: Alios BioPharma. **SILVER**: AbbVie, Burroughs Wellcome Fund, Chimerix, JCR Pharmaceuticals Co. Ltd., Southern Research Institute. **BRONZE**: ACS Infectious Diseases, Antiva Biosciences, Center for Drug Design – University of Minnesota, Elsevier B.V., ImQuest BioSciences, Institute for Antiviral Research – Utah State University, Oxeltis, Riboscience, Toyama Chemical Co. Ltd., and XpressBio **The ISAR Preseidents' Fund:** Jan Balzarini, Joseph M. Colacino, José A. Esté, Phillip A. Furman, Douglas D. Richman.

It is with pride and admiration that I congratulate Michael Sofia as the recipient of the 2017 Gertrude Elion Memorial Lecture Award, Chung K (David) Chu for the Antonín Holý Memorial Lecture Award and Maaike Everts for the William Prusoff Young Investigator Lecture Award. They honor the society by sharing their thoughts, knowledge and experience with us. I look forward to their lectures and celebrating with them their commitment to antiviral research and to ISAR.

I take this opportunity to recognize and acknowledge the unselfish and dedicated work of ISAR's former president Amy Patick who has communicated to me that she will be unable to come to the 30th ICAR and will be stepping down as Chair of the committee for The Chu Family Foundation Scholarship for Women Scientists. Amy has played a leading role in many of ISAR activities and was instrumental in the creation of the Women in Science Committee and its Roundtable. We look forward to seeing her back in future meetings.

In October 2016, we initiated the ISAR Webinar series in antiviral drug development with the latest one given by James Crowe on April 2oth, 2017. The webinars have been very well received and appreciated by ISAR members and the general public with interest in the field. We would like to congratulate Raj Kalkeri from Southern Research and his team for leading this effort and to all webinar speakers for their participation. ISAR will continue to encourage and support this initiative.

I hope you find this new issue of the ISAR News informative and interesting. We hope that it will also encourage your participation in all ISAR activities.

We want to hear your thoughts and opinions on what is important to you. Please feel free to contact us at info@isaricar.com. We look forward to seeing you in Atlanta.

WELCOME TO ATLANTA

(David Chu and Dennis Liotta)

Dear ICAR Attendees,

We hope that you have a pleasant experience at Hartsfield-Jackson Atlanta Airport and during the ride to the Hilton. We are happy to welcome you now to the 30th ICAR in Atlanta. From the Women in Science roundtable on Sunday at noon, until the final oral session on Thursday morning, there will be five days of the most exciting science in antiviral research and development, from chemistry to clinical trials in a conveniently located venue the Hilton Atlanta.

As the Hilton Atlanta is in the epicenter of the metropolis, a number of the attractions that Atlanta has to offer are within walking distance. You may explore the rich cultural history of Atlanta by visiting the Carter center, or take a tour at the CNN News Center less than a mile away. You can also visit Centennial Park, home to the 1996 Summer Olympics, or the Georgia Aquarium, the largest of its kind in the Western Hemisphere. In the same area, you can also visit the Coca-Cola Museum, a fantastic destination for viewing exhibits and sampling hundreds of beverages. For those with an inclination toward sports, the Phillips Arena (host of Atlanta Hawks basketball) and the Georgia Dome (home to the Atlanta Falcons football team, who almost won the Super Bowl) are short walks away. The nearby Fox Theater presents shows ranging from musicals to comedy attractions.

If you have time, it is worthwhile to visit the famous midtown Buckhead area, home to boutique stores and a large collection of restaurants, as well as the Lenox Mall, a major shopping center in the South. You may also visit the famous Margaret Mitchell House & Museum located in Midtown

As Atlanta's traffic is the most notorious in the South, you may want to take some precautionary measures on the street and roads.

Welcome again to the deep-South of the USA, and we hope you will have good time while in Atlanta!

30th ICAR USEFUL INFORMATION

(Anthony Vere Hodge)

The 30th ICAR will run from 2 pm on Sunday, May 21 through 12:30 pm on Thursday, May 25, 2017.

Online registration is still available. Save yourself time onsite and register now!

Category	**$ (USA)**	Discount vs Full Rate
Regular rate	**970**	-
Regular rate - ISAR members	**815**	16%
Regular rate - students	**350**	64%
Accompanying person (Guest)	**200**	-

Hotel Information

ISAR will host the 30th ICAR at the Hilton Atlanta.
255 Courtland Street NE
Atlanta 10950
United States
TEL: +1-858-558-1500
Check-in: 4:00 pm. Check-out: 11:00 am.

Group Rate for ICAR attendees: $169 plus tax (single/double), $201.04 inclusive. The ICAR rate includes complimentary guest room wireless internet. The reservations deadline was April 30th but the hotel will continue to accept reservations at the Group Rate based on availability. Please contact the hotel directly to make your reservation.

Airport – Hotel ground transportation

The hotel is approximately 15 minutes from the Hartsfield Jackson International Airport. A taxi costs approximately $30 one-way and a Super Shuttle costs approximately $16 one-way. You may also take the rapid transit system (MARTA), which is $3.50 one-way. The Peachtree Center station is only a few blocks from the hotel. Visit www.atlanta.net for complete transportation details.

AN OVERVIEW OF THE 30TH ICAR

Program Overview (Justin Julander and Mark Prichard)

The 30th ICAR in Atlanta Georgia is now here and the program committee is happy to report that there is a great schedule just ahead of us. The meeting starts on Sunday May 21st and finishes on Thursday May 25th at 12:30pm. We are excited to announce that the program is filled with some wonderful keynote speakers, including Ann Palmenberg, Eric Hunter, Mark Pallansch and Pei-Yong Shi, who will all present cutting edge research on a variety of topics related to antiviral research. The featured Antiviral Immunity and Emerging Virus Symposia also includes several speakers who will provide important insights and updates in these topics. The Drug Development 101 will once again provide much needed information in regard to setting up a company in order to move a compound toward clinical use.

General speakers at the meeting are covering a wide variety of topics, including *in vitro* antiviral activity, medicinal chemistry, mechanism of action, animal models and clinical trials, which will highlight notable developments in the field of antiviral research. The schedule for the conference also includes many opportunities for all participants to establish and maintain close collaborative relationships among chemists, pharmacologists, biologists and regulatory agency representatives that are required for the discovery and development of effective antiviral therapies. It also fosters opportunities for graduate students and young investigators to establish themselves within the field and start on the path to a successful career. These opportunities include the career development panel, the women in science roundtable and the new member social hour. Please, do take advantage of all the opportunities that your society provides to you.

We thank the board and the many reviewers that worked so hard to help identify the most important and topical work in their focus areas. We anticipate that, as every year, the talks and posters will be of great interest to all of us. We look forward at all of us very much enjoying the 30th ICAR during the coming days!

Women in Science Roundtable (Rhonda Cardin)

Please join us for the ICAR 5th Annual Women in Science Roundtable on Sunday, May 21st, from 12:00 pm to 1:45 pm.

This year's roundtable will provide attendees an opportunity to engage in discussions with leading scientists in the antiviral research field, including ***Priscilla Yang***, Harvard Medical School and 2017 WIS-Sponsored Speaker, ***Ingor Damon***, CDC, ***Julie Dyall***, NIAID, NIH and Tunnell Consulting Company, ***Heather Greenstone***, NIH and ***Rhonda Cardin***, Louisiana State University.

We invite everyone to participate in the discussion on the challenges and opportunities women scientists encounter in today's work environment. This event is limited to 80 participants so if you haven't registered yet please register as soon as possible in the Events section of the registration page for ICAR. Coffee and dessert will be provided. We look forward to seeing you there!

Poster Awards (Kathie Seley-Radtke)

SHOW ME THE MONEY!!! As in past ICARs, the much anticipated poster competition will be held again this year at the ICAR meeting in Atlanta! The three categories eligible for the cash prizes, which range from $250 to $1000, are 1. student (graduate or undergraduate), 2. postdoctoral and 3. junior investigator. Note that you must have registered your desire to be judged when you submitted your abstract, as well as which category you fall under. When you check in at registration, you will be given a tag for your poster such that the judges can identify you. It is important that you be at your poster during the designated judging times. If you are not there when the judges come by, you will not be considered further. The judges will also be looking for those poster presenters who exhibit the best communication skills – a few outstanding (and lucky) presenters will be selected for the 5 minute shotgun talks on the last day of the meeting. So…sharpen your presentation skills and practice those elevator talks – remember you will have only 3 minutes to impress the judges when they stop at your poster. See you in Atlanta!

The Chu Family Foundation (TCFF) Scholarships (Amy Patick)

Thanks to a generous donation from the Chu family, seven young women with the potential to make significant contributions to the field of antiviral research will receive the TCFF Scholarships in 2017.

To be eligible, an applicant must be working in an area of antiviral research and either be an

undergraduate or graduate student, or have no more than five years of cumulative postdoctoral experience. Graduate students and postdocs must be a member of ISAR at the time of application and have demonstrated their ability to do independent scientific work, their potential for a high level of scientific endeavor and their leadership skills.

This year, the applications were highly competitive. Five young women were chosen to receive $1500 scholarships and the two who were tied for 6th will receive $1000 awards. The applicants who applied were from all over the world, including Belgium, United Kingdom, China, Finland, Greece, Italy, Argentina, Spain, Australia, and the United States. The scholarship funds are to be used to attend a conference, visit a laboratory, take a course or acquire specialized training. The awards also include a 2-year membership in ISAR and a commemorative certificate. The TCFF and WIS Committees will present the awards to those promising young scientists who will be attending the 30th ICAR in Atlanta, GA, USA.

2017 First Women in Science invited speaker: Priscilla Yang, Ph.D. (Mike Bray)

Priscilla Yang is an associate professor at Harvard Medical School. She grew up in Pine Bluff, Arkansas and did her undergraduate studies at Yale, where she originally planned to major in the humanities, until a work-study job in a laboratory and an unanticipated enjoyment of organic chemistry led her to switch majors. After receiving combined BS/MS degrees in molecular biophysics and biochemistry in 1993, she moved to Berkeley, where she did her Ph.D. research with Peter Schultz in the College of Chemistry. As a postdoctoral fellow with Frank Chisari at the Scripps Research Institute, she developed the murine hydrodynamic injection model of hepatitis B that has become widely used to study virus-host interactions and to test candidate antivirals.

Priscilla joined the Harvard faculty in 2004, establishing a research group in the Department of Microbiology and Immunobiology. Her lab employs a combination of chemical and pharmacological approaches to address basic problems in virology. Her group's recent efforts have centered on increasing the number of validated antiviral targets, identifying alternatives to combination therapy to minimize the development of antiviral resistance, and investigating the function of lipid membranes in RNA virus replication.

Her antiviral work has particularly focused on dengue, Zika and other flaviviruses for which there are no approved therapies. Her group has identified the known drug 4-hydroxyphenylretinamide (4-HPR) as an inhibitor with a high barrier to resistance targeting RNA replication. They have also developed

Priscilla Yang

strategies for the rapid identification of host-targeted covalent inhibitors as broad-spectrum antivirals against diverse RNA viruses; investigated drugs that simultaneously inhibit more than one target, as an alternative to combination therapy with multiple drugs as a way of minimizing antiviral resistance; and established tools to enable the development of direct-acting antivirals targeting the flavivirus envelope protein.

As an advocate for diversity in science, Priscilla has mentored female graduate students through the Harvard Graduate Women in Engineering and Science. She has also actively recruited, mentored and championed trainees from under-represented backgrounds, both in her own lab and in under-graduate and graduate research programs.

What has been your experience as a woman in science?

I'm grateful to have had mentors who encouraged me to set high personal and professional goals, even when they didn't necessarily align with what they thought I should do! I feel very fortunate that I've been able to pursue an exciting research career while finding joy and fulfilment as a mother. I also appreciate the opportunities I now have to support and encourage my more junior colleagues.

What advice would you give to young women starting their careers?

Make your priorities clear, both in your scientific life and your personal life, and stay true to those priorities. There are some challenges that almost everyone has to overcome, such as being a working parent, finding good mentors or applying for promotion. Seeing how other people have handled those challenges gives you a basic set of options from

which to find the best way forward. And if none of them feels like a good fit, don't be afraid to come up with your own solution!

2017 ISAR AWARD WINNERS
(Mike Bray)

Winner of the Gertrude Elion Memorial Lecture Award: Michael J. Sofia, Ph.D.

Mike Sofia is the principal inventor of sofosbuvir (Sovaldi® and Harvoni®), the first curative treatment for chronic hepatitis C. He is Chief Scientific Officer of Arbutus Biopharma, a company focused on the discovery and development of curative therapies for hepatitis B. He is listed on more than 50 US patents and on numerous other patent applications, and has authored over 100 research papers and 12 book chapters. He holds a professorship at the Baruch S. Blumberg Institute in Doylestown, PA and is an adjunct professor at Drexel University School of Medicine in Philadelphia.

Mike earned a BA degree in chemistry from Cornell University in 1980 and received his Ph.D. in organic chemistry from the University of Illinois, Urbana-Champaign in 1984. He did his postdoctoral training in synthetic organic chemistry as an NIH fellow at Columbia University. During his early career in the pharmaceutical industry, he held the position of Group Director for New Leads Chemistry at Bristol-Myers Squibb, Vice President of Research at Intercardia Research Labs and research positions of increasing responsibility at Eli Lilly and at the Squibb Institute for Medical Research. He then moved to Pharmasset and was senior vice president for chemistry until its acquisition by Gilead in 2012. He then co-founded OnCore Biopharma, which merged with Tekmira in 2015 to form Arbutus.

In addition to his "day job," Mike is a member of the editorial advisory boards of several scientific journals, the Board of the Blumberg Institute and the Board of Trustees of the University of the Sciences in Philadelphia. He was the recipient of Pennsylvania Bio's 2014 Scientific Achievement Award, the 2015 Heroes of Chemistry Award of the American Chemical Society and the 2016 IUPAC-Richter Prize. Together with Charlie Rice and Ralf Bartenschlager, he received the 2016 Lasker-Debakey Award in Clinical Medical Research for his contributions to discovering a cure for hepatitis C.

What are your current research interests?

Hepatitis C is now a curable disease, but hepatitis B remains a much larger problem, with over 350 million infected people worldwide. For example, more than 10% of the Chinese population is chronically infected with HBV. After success with hepatitis C, I therefore turned my attention to hepatitis B, by founding a company with the specific mission of discovering a cure. Arbutus Biopharma was founded in 2012 and is now a publically traded company with over 140 employees, 65 of whom are in discovery research.

As CSO, I'm the strategic architect for Arbutus, and lead all research efforts. We're evaluating both direct-acting antivirals and immune modulators against a number of targets, to try to control and eradicate HBV. We hope to develop drugs that will play an important role in combination regimens, similar to the approach for hepatitis C. Arbutus Biopharma is now considered one of the leading drug discovery and development companies for hepatitis B, with multiple candidates now in preclinical development or expected to advance to clinical trials in the near future.

What has been the importance of ISAR for your career?

Being an ISAR member has been a tremendous asset for my scientific development. The society has provided me with exposure to some of the most accomplished scientists in the field and to cutting-edge research through the annual meeting. Working in drug discovery, we sometimes become very focused on our specific area, but the broad antiviral platform provided by ICAR gives me exposure to other areas of research and helps me to appreciate the may unmet medical needs where we need to direct our attention and try to make a difference.

Winner of the Antonín Holý Memorial Lecture Award: C. K. (David) Chu, Ph.D.

David Chu is a Distinguished Research Professor, Emeritus at the College of Pharmacy of the University of Georgia. He obtained a BS degree in pharmacy from Seoul National University, and after serving as an officer in the Korean Navy, he came to the United States, receiving a MS degree from Idaho State University in 1968 and a Ph.D. in chemistry from the State University of New York at Buffalo in 1975. After working as a postdoctoral fellow in drug discovery at the Memorial Sloan-Kettering Institute of Cancer Research, New York, he stayed on as a research associate for six years before joining the faculty of the University of Georgia in 1982.

David has devoted his 40-year career in medicinal chemistry to the discovery of anticancer and antiviral agents. He has published more than 300 peer-reviewed articles in organic, biochemical and medicinal chemistry, and has edited four textbooks. During his academic career, he has discovered a number of clinical candidates for cancer and for viral diseases, and he is listed as inventor on 60 US patents. He was one of co-founders of Pharmasset and ATEA Pharmaceuticals. He has trained more than 120 graduate students and postdoctoral fellows, and has maintained an active research program in drug design and synthesis since his retirement in 2008. His program in drug discovery has been recognized nationally and internationally.

Among his many honors, David has held an endowed professorship of the University of Georgia Research Foundation, received the Creative Research Medal from the University of Georgia and an NIH Merit Award (2001-2011). He is an elected Fellow of AAAS. For his achievements in nucleoside chemistry and chemotherapy, he received the John A. Montgomery Award from the International Round Table Society in 2014. He was elected a Fellow of the National Academy of Inventors in 2015 and received the Willis Gregory Award from the School of Pharmacy of the SUNY Buffalo in 2017.

What are your current research interests?

Our work focuses on the discovery of antiviral agents for emerging viral diseases, including Zika, dengue and West Nile viruses, in collaboration with a biotech firm. The main target for these viruses is RNA dependent RNA polymerases. The type of chemistry that we have been pursuing is nucleoside chemistry, which provides us with interesting and challenging projects.

Another area of antiviral agents has been in our long-standing drug discovery efforts for anti-HBV agents, in which we have recently discovered a novel anti-HBV carbocyclic nucleoside agent, FMCA, which can provide effective anti-HBV activity against drug-resistant HBV mutants. Our group has been working on the practical synthesis of FMCA and its phosphoramidate prodrug for in vivo evaluations to access FMCA as a potential candidate.

What has been the importance of ISAR for your career?

As a loyal member for 30 years, I've attended every ICAR since the first one in Williamsburg, with the single exception of the 1996 meeting in Urabandai, Japan. The main reason I've always been so devoted to ICAR is that it's the best place for a chemist to learn about the overall aspects of antiviral-related science. No other meeting covers the whole range of subjects from virology and pharmacology to clinical science, which are required to obtain an overall perspective of the field. In addition to hearing talks on subjects of interest, I can meet and establish collaborations with experts in my own areas, which is critical for moving my discovery program forward. I would not have attended all of the ICAR meetings if I did not feel that ISAR members welcomed and encouraged the participation of chemists!

Winner of the William Prusoff Young Investigator Award: Maaike Everts, Ph.D.

Maaike (pronounced "Micah") Everts is an Associate Professor in the Division of Infectious Diseases of the Department of Pediatrics, University of Alabama School of Medicine at Birmingham. She was born in Meppel, the Netherlands. After receiving a Masters degree in pharmaceutical sciences and a Ph.D. in pharmacokinetics and drug delivery from the University of Groningen, she moved to UAB for postdoctoral training with David Curiel in the

Division of Human Gene Therapy, where she pursued her interest in targeted gene delivery for the treatment of cancer, using adenoviral vectors. She joined the UAB Department of Pathology in August 2005, continuing her research on targeted therapies using gene therapy and nanotechnology approaches.

Maaike Everts

Since 2009, Maaike has been the Associate Director of the Alabama Drug Discovery Alliance, a collaboration between UAB and Southern Research, which has the goal of finding new small-molecule drugs for unmet medical needs in a variety of therapeutic areas. She also assists physician-investigators with the IND application process, and provides quality assurance for the UAB Vector Production Facility, which manufactures novel drugs for Phase I clinical trials. She is also the Administrative Director for the Antiviral Drug Discovery and Development Center, a multi-institutional consortium headed by Rich Whitley and funded by a U19 grant from NIAID.

Maaike joined ISAR in 2015 and attended the 28th ICAR in Rome. She notes that she was impressed by the collegiality of the attendees and the inter-disciplinary nature of the sessions, which merged biology with medicinal chemistry and other disciplines needed for effective antiviral research. In 2016 she was invited to join the Women in Science committee and to be responsible for organizing the career development panel. Maaike says that attending ICAR "has truly been a joy: members are extremely encouraging of each other and provide mentorship throughout the different stages of their careers."

ISAR ACCOUNTS (Brian Gowen)

In this installment of ISAR News, we take the opportunity to share the society's finances related to 2016. The accounting for the 2016 ICAR held in La Jolla, CA was published in the previous issue. We have included it once again (Table 1) in the current issue for the benefit of the 2017 ICAR attendees. Despite the negative balance after paying all expenses associated with the 2016 ICAR, ISAR remains in good financial ground with no outstanding liabilities and net assets totaling approximately $633,400 USD at the end of the latest fiscal year, which ended September 30, 2016 (Table 2). A summary of the income and expenditures for the entire year 2016 is provided in Table 3. As evident in the numbers, the generous corporate, academic and private sponsorship, together with the meeting registration fees are by far the greatest source of income to support the annual ICAR and the operations of the society. These are difficult financial times. To this end, the society leadership is evaluating and considering ways to maintain the financial health of ISAR going forward without reducing the impact and quality of the annual ICAR and the many other member benefits and programs.

29th ICAR
La Jolla, CA, USA
April 17-21, 2016

Revenue	$ (USA)
Registration	130,175
Corporate Sponsorship	146,480
WIS	3,292
Hotel Commission	11,830
Total Revenue	**291,777**
Expenses	
Advertising	2,625
Food, Beverage, Events	107,980
Audio Visual	32,165
Venue/Hotel Services	2,118
Exhibits/Posters	8,460
Invited Speakers	23,561
Courtesy Associates – Out of Pocket	6,977
Courtesy Associates – Labor	71,760
Credit Card Fees	6,737
Registration Supplies	209
Shipping	890
Awards*	57,487
Total Expenses	**320,968**
Net Balance	**– $29,191**

* Elion, Prusoff, Holý, Poster & Travel

Table 1. 29th ISAR Accounts

Asset Statement
International Society for Antiviral Research
September 30, 2016

Assets	$ (USA)
Bank Accounts	287,016.18
Wells Fargo CD	107,974.89
Cetera Investment Account	64,821.62
Fidelity Investment Account	173,585.21
Total	**633,397.90**
Liabilities	
None	

Table 2. Asset Statement

International Society for Antiviral Research
Financial Statement – 2016

Income	$ (USA)
Membership Dues	9,250.00
Sponsorship	158,309.50
TCFF WIS Sponsorship	10,000.00
2016 ICAR Registrations	125,300.00
Investments Gains/Losses	10,577.81
Total	**313,437.31**
Expenditures	
Administrative	17,034.04
WIS	12,292.11
ICAR - 2016	313,811.09
ICAR - 2017	9,538.60
Donations	255.00
ISAR Management	3,362.12
Total	**356,292.96**
Net Balance	**– $42,855.65**

Table 3. Financial Statement 2016

THE ISAR AMBASSADOR PROGRAM

(Raj Kalkeri -Coordinator and the Ambassador Team)

In order to enhance the awareness of ISAR in the scientific community, we have initiated the ISAR Ambassador Program. As part of this program, several ISAR members in different geographical regions around the globe were nominated as ISAR ambassadors, to educate others in their scientific community and spread the word regarding the scientific benefits of participating in ISAR activities and attendance of the ISAR conference (ICAR). This "*ISAR Ambassador Program*" adds significant value to multiple areas such as enhanced networking opportunities, and adds the intellectual diversity that is so critical for the scientific progress of antiviral drug discovery and development. The ISAR Ambassadors are selected based upon their participation in the previous ICAR conferences and nominations from ISAR executive committee. The motto of this program is: "Educate, Enable and Enhance (3E's) ISAR".

ISAR Ambassadors and Travel Grants:

ISAR is an international organization and many of our members (and in particular students and post-docs) from the developing areas of the world (e.g., Africa, East Asia, South America etc.) have financial difficulties to attend the ICAR meetings. ISAR ambassadors are helpful in identifying the meritorious prospective attendees who have submitted abstracts for posters or oral presentations at the conference. These prospective attendees are recommended for travel assistance from ISAR to attend the conference.

Vision 2020:

In the next few years, we would like to increase the presence of our ISAR ambassadors (and ISAR members) and their activities across the globe. Our focus is on enhancing ISAR membership benefits. These membership benefits include outreach to international corporate sponsors, leading in the proposing of scientific contributions to social media (Facebook), creation of focus groups (virus targets with post-docs as moderators), and enhancing participation in these focus groups. The ISAR ambassador program has plenty of potential and will be a great tool for the strategic growth of ISAR. We plan to also incorporate feedback from our ISAR ambassadors in ICAR scientific agenda to enhance the ICAR/ISAR scientific program impact. In summary, the ISAR ambassadors serve as community representatives to the ISAR society. Please contact ISAR office bearers if you are interested in this program.

Geographical location of ISAR Ambassadors

★ ISAR Ambassadors

MEMORIES FROM PAST ICARs

1, 5, 10 and 20 years ago
(Brian Gentry and Luis Schang)

Bart Tarbet, Heather Greenstone, Eric Stavale and Simon Tucker enjoy an enjoyable chat last year in La Jolla, California.

ICAR has always provided an open and friendly environment to interact with our colleagues, as Michael Sofia, Amy Patick, Joe Colacino, Phil Furman, Murakami Eisuke and Paulette Furman did five years ago in Hokkaido, Japan.

Andrea Brancale, the late Chris McGuigan and Chris Meier in Palm Springs, 2007.

Ten years ago in Palm Springs, John Drach has a friendly discussion with Leroy Townsend at a poster session, while enjoying a couple of nice glasses of wine

Don Smee, Bob Sidwell, Dale Barnard, a young-looking Brian Gowen and Kie-Hoon Jung enjoying an after-dinner relaxed chat in Palm Springs in 2007.

Trudy Elion, Nobel Laureate, twenty years ago at the previous ICAR in Atlanta (1997)

AN ANTIVIRAL SUCCESS STORY FROM THE TRENCHES

Interview with Jean-Michel Pawlotsky

(Luis Schang)

Jean-Michel Pawlotsky is the Chief of the Virology Unit and the Director of the Department of Virology at the Hôpital Henri Mondor, and a Professor of Medicine at the University of Paris XII. He is also the Director of the French National Reference Centre for viral hepatitis B, C and D.

Thank you very much Dr. Pawlotsky for giving us your time and sharing with the ISAR members your thoughts and perspectives about the development of HCV therapy.

It is a rare opportunity to have the chance to hear about the entire history of the development of a successful antiviral therapy from somebody who so actively participated through the entire process at the interface within the patients and the science.

Jean-Michel Pawlotsky

From the discovery of HCV in 1989, only two basic drugs were approved for almost twenty years. From the early treatments with non pegylated interferon to the standard of care treatments still in use in 2010 including pegylated interferon and ribavirin, options were limited, progress on new antivirals was challenging, and no new drugs were emerging. You were in the frontline through all those testing times, could you tell us about your personal experiences dealing with the limitations of HCV therapy even five years ago? Were there any major sources of frustration or hope?

To be very honest, I don't think we were ever frustrated in the HCV field as things moved so fast, even faster than we thought! Part of the reason is that all the research done before on HIV drug development helped accelerate developments on HCV drugs, and every time we could feel frustrated, something new was coming. It is true that we lived 15 years with peginterferon and ribavirin, but even with these regimens we could cure half of the patients. I think the most frustrating at that time was that we had no drugs at all to treat patients with decompensated cirrhosis, as interferon was contraindicated. So the first study, SOLAR-1 with sofosbuvir and ledipasvir, was really exciting when it was presented for the first time. Another "frustration" was when telaprevir and boceprevir became available in 2011. Everybody was very excited by the hope for 70% cure rates in genotype 1 patients, but we had to lower our sights because of the very frequent and often serious adverse events, especially in patients with advanced liver disease. Most doctors however decided to "warehouse" all patients who could wait, because we knew new DAAs would be available soon. Then, a bit of frustration with sofosbuvir/ribavirin for genotype 3 patients but daclatasvir became available soon after sofosbuvir and could be combined with it. Overall, more joy than sadness.

As you just mentioned, the first generation protease inhibitors reached the clinics with the approval of boceprevir and telaprevir in May 2011, they raised the enthusiasm, only to quickly dampen it again as a result of their side effects in the actual clinical settings. Were you optimistic at that time that these limiting toxicities were going to be solved so quickly? What led you into thinking in that direction?

We were optimistic. There had been some warnings about potential cutaneous side effects with telaprevir, but nothing as frequent and possibly bad as what we saw when these drugs reached the clinic. The main reason is that as soon as the drugs were available, patients with advanced although compensated liver disease were treated in large numbers. We were the first in France (ANRS: Agency for Research on AIDS and Viral Hepatitis), with the CUPIC cohort, to realize these patients had frequent and often serious adverse events, and the results of therapy were not as good as expected from the trials. This was a good lesson and explains the importance of real life confirmation of clinical trial data when others drugs subsequently reached the market. Although there were no major safety signals with the subsequent drugs, the field remained cautious and accepted the good safety and tolerance only after thousands of patients from real-world practice were reported.

The structure of the HCV protease without a clearly well-defined substrate binding site was considered challenging for antiviral development, until the clinical trials with BILN2061 proved it to be a viable clinical target, and no RNA-dependent RNA polymerase inhibitor had been developed against any virus until sofosbuvir. Were these breakthroughs in antiviral therapy surprising to you? When did you for the first time start to think that HCV could be cured in the vast majority of the patients? Was there any particular event that gave you any early hint that this goal was achievable?

Well, I knew for years that HCV was an easy to cure virus, based on the nature of its intracytoplasmic lifecycle and the fact that interferon could cure half of the patients. The ones who could not be cured were just those who did not respond to interferon and this was host-related, not virus-related. We just needed more potent, more specific antiviral drugs. And they finally came. Protease inhibitors or nucleoside / nucleotide analogues were not a surprise to me. Ideas from the HIV field (and, before HIV, from herpes virus research) were used to identify compounds active against viral enzymes and at the end it happened to work. The real (good) surprise was the NS5A inhibitors. This is the big discovery of the HCV therapy field. A new target, a new very original dual mode of action (NS5A inhibitors disorganize the replication complex thereby inhibiting viral replication; they also block viral particle assembly and release). This dual mode of action explains that these drugs are very potent and act very rapidly. They have become the backbone of all HCV therapies. This is the really important discovery in the HCV field.

You of course did not just sit and wait for the development of all these HCV therapies; you were very much involved in the process. Through the years, you have built a most successful and fairly complex group including clinical trials, clinical virology and basic research. How important do you think it was to have the different areas of expertise in your group to help in the clinical development of antivirals against HCV?

I believe the key of our group's success has been its multidisciplinarity. I was able to bring clinicians, clinical virologists, pathologists, radiologists, basic scientists (working both on the virology and also liver pathophysiology) to work together in the same research group. This is the definition of translational research. Having clinical virology was instrumental, this is often where the gap was in other groups. This way, we were deeply involved in both diagnostic and therapeutic developments over the years and I am particularly grateful to the group and proud of what we achieved together.

A few years ago, you were giving talks in which 75% SVR was considered a success in HCV therapy. Nowadays you talk about sometimes even 75% SVR in the difficult to treat patients with unfavorable IL28B alleles, infected with the more difficult to treat HCV genotypes, who have not responded to previous treatments and who have advanced liver disease. Can you foresee in the future in which even these patients will achieve high rates of SVR? What do you think will make the difference for these patients?

I believe very soon. With the next (and final) generation of drugs, what we will have on the market, what we know about treatment optimization and retreatment, we will cure almost all patients. There will remain a few patients, mostly with cirrhosis, a history of prior failure, pre-existing resistant viruses, etc. who will occasionally be incurable. We just have to accept it as this will be very rare, and remember that when I just entered the field in the early 1990s, the cure rate was 6% !

From 6% SVR in all patients to more than 90% in most of them is great progress, indeed. How do you envision the future of HCV, both disease and treatment? Do you think the virus will be eradicated with treatment alone? Do you see it persisting in particular populations? Do you foresee any chances of selecting for new genotypes that are resistant to all current and soon-to-be available therapies?

I believe countries that will be able to implement national action plans including awareness, screening, diagnosis, access to care, *etc.* will be able not to "eliminate" but to "control" the infection, which will become a rare event restricted to specific subgroups of patients. I am optimistic that, if patients are treated appropriately, we will not spread resistant viruses through new infections. But we must be careful in some groups of active PWIDs *(people who inject drugs)*, some MSM *(men who have sex with men)* with high-risk practices, incarcerated individuals, *etc.*

As a conclusion, do you think that the research and development invested in HCV and its therapy has been a success story? Do you see it as a forbearer of the development of antiviral therapy in general? Any other closing thoughts you would like to share?

It has been an incredible success story that has been possible only through a close interaction and collaboration between the academic world and the drug industry, following other success stories (HIV, hepatitis B virus, even if these viruses are not curable, unlike HCV, but the clinical results are outstanding too). Many lessons can be drawn from this adventure and HCV is a good model to study other RNA viruses of medical importance and can be used to develop inhibitory approaches for these infections. The field will have to move into different directions. Other viral infections do not represent markets as lucrative as HIV or hepatitis viruses. The

trend is towards the identification of broad-spectrum antiviral drugs, *i.e.,* drugs that block host mechanisms and are thus active against different viruses from the same family or different families of viruses, rather than the development of virus specific compounds. All the knowledge accumulated through HCV drug development will be helpful in that regard, including the unsuccessful development of host-targeted agents that may become successful for other viral infections.

On behalf of all ISAR members, thank you very much, Jean-Michel, for your time.

A TRIBUTE TO THE LATE MARK BULLER

(Mike Bray)

Mark Buller, one of the world's leading poxvirus researchers and a friend and colleague of many ISAR members, died in late February when he was hit by a car while riding his bicycle. He was 67. He is survived by his wife Joslyn and daughters Dawn and Meghan.

Mark Buller
(Courtesy of Saint Louis University)

Mark was born in Victoria, British Columbia and received his Ph.D. from the Institute of Virology in Glasgow, Scotland in 1976. After performing a postdoctoral fellowship and continuing as a staff member at the National Institutes of Health in Bethesda, he joined the faculty of Saint Louis University in 1994. He was a professor in the SLU Department of Molecular Microbiology and Immunology at the time of his death.

Mark was one of the small number of scientists to devote his career to poxvirus research, despite the global eradication of smallpox in the late 1970s. Poxviruses were actually not his original interest; his initial postdoctoral work focused on adeno-associated viruses. However, an outbreak of mousepox in the NIH animal facility in 1979 brought the agents to his attention, and he joined Bernie Moss's lab in 1982. His investigation of mousepox outbreaks at the NIH and other laboratories was facilitated by the construction of a new BSL-3 containment facility on the NIH campus. By the end of the 1980s, he had become a recognized authority on poxvirus pathogenesis.

Ten years later, Mark's expertise came to have unexpected value for national security, when revelations of biowarfare research in the former Soviet Union made the use of weaponized variola virus a significant concern. He played a critical role in the efforts to test new antivirals, using ectromelia and other poxviruses as surrogates for variola, focusing in particular on the evaluation of tecovirimat (ST-246) and brincidofovir (CMX001). He was especially concerned about the potential development of genetically engineered poxviruses, and evaluated combinations of antivirals and vaccines against IL-4-encoding ectromelia viruses.

In addition to his own research, Mark also took on broader responsibilities in biodefense, by initiating the select agent program at SLU, serving as director of the Aerosol Biology Core Facility of the Midwest Center of Excellence in Biodefense and acting as an advisor to government committees.

Numerous tributes to Mark can be found on the SLU website. Sharon Frey writes, "Everybody loved Mark, as a colleague and as a friend. He tried to make sure that people had what they needed to do their research, and he was very collaborative." Bill Wold, his department chair, says that "Mark was the ultimate team player, a tremendous faculty member who not only had an outstanding research program of his own, but was intent on helping everyone else in the department and in the School of Medicine." Scott Parker, who began working in Mark's lab after receiving his Ph.D. in 2006, writes "It's amazing how many people 30-plus years his junior owe their careers, relationships and friendships to him. Many people have used the terms 'father figure' and 'second father" to describe him. He was a genuinely kind and caring man who would do anything for you. He showed us how human beings should behave, and his death has ripped a massive hole in all of our lives."

For additional tributes to Mark, see the article on the SLU website,
https://www.slu.edu/news/2017/february/mark-buller-obituary

A TRIBUTE TO THE LATE MARK WAINBERG

(Joe Colacino, Amy Patick, Bob Buckheit and Karen Buckheit)

It is with sadness that we note the passing of Dr. Mark Wainberg, a great scientist and a great friend of the International Society for Antiviral Research. Mark was the Director of the AIDS Centre at McGill University and Head of AIDS Research at Jewish General Hospital's Lady Davis Institute for Medical Research in Montreal. Mark passed away as the result of a swimming accident on April 11, 2017 in Bal Harbour, Florida. Mark was a world renowned virologist who was responsible of identifying the anti-HIV activity of the nucleoside analog, 3TC (lamivudine). Lamivudine eventually became an important component of a combination therapy for the treatment of AIDS and helped to eliminate the death sentence that came with HIV infection in the early days of the AIDS epidemic.

Mark was born in Montreal on April 21, 1945 to a family of modest means. He graduated from McGill University with a bachelor's degree and obtained his Ph.D. in molecular biology from Columbia University and did post-doctoral research at the Hadassah Medical School of the Hebrew University. Mark became a staff investigator at McGill in 1974. In his own lab, Mark embarked on his studies of HIV as the AIDS epidemic began in the 1980's and early on he worked with Dr. Robert Gallo, the co-discoverer of HIV. Mark's work with lamivudine and HIV prompted his studies of viral resistance and the genetic basis for the ability of HIV to become resistant to various antiviral drugs. These studies steeled Mark's resolve to find a cure for HIV.

Mark Wainberg
(courtesy of Lady Davis Institute)

In addition to being a world respected scientist with stellar credentials, he did not shy away from patient advocacy and the politics of the AIDS epidemic. He became outraged at world leaders who denied or would not acknowledge the viral cause of AIDS. Mark would refer to HIV deniers as "crack pots" and often said that, by their denial, they contributed to the spread of HIV and AIDS. To increase awareness of the link between HIV and AIDS and to increase access to antiviral drugs among Africans, Mark, as President of the International AIDS Society from 1998-2000, selected Durban, South African for the Society's conference city in 2000. Mark worked tirelessly, relentlessly and visibly to educate world leaders about HIV/AIDS and to make it known that a virus is the direct cause of AIDS. Mark's message to these leaders was that only stopping the transmission and replication of HIV would curtail the spread of AIDS. Mark's pioneering research in HIV/AIDS prompted his support of the LGBT (lesbian, gay, bisexual and transgender) community to the extent that he marched in parades to raise awareness of their causes.

As mentioned, Mark was a president of the International AIDS Society. He was also a co-chair of the XVI International AIDS Conference and was a past president of the Canadian Association for HIV Research. Mark was a founder and Editor-in-Chief of the Journal of the International AIDS Society and editor of AIDS Research and Human Retroviruses. Mark was the recipient of many honors. In 2000, he was appointed as a Fellow of the Royal Society of Canada. In 2001, for his "major contributions to the study and treatment of HIV/AIDS", Mark was named an Officer of the Order of Canada, the nation's top civilian honor. In 2005, he was commissioned as an Officer of the National Order of Quebec. In 2008, Mark became a Chevalier de Legion d'honneur, the highest honor given by France.

In 2008, Mark gave the keynote address at the 21st International Conference on Antiviral Research in Montreal, in which he discussed and examined the potential path in antiviral drug development for the following decade. At that conference and many others, Mark was known as a friendly, down-to-earth individual who was generous with his time and talents and supportive of his students and colleagues. Having a curious intellect and quick wit, he was an

entertaining conversationalist and dinner companion. One of the most notable things about Mark was his ability to engage anyone in a scientific conversation, ranging from colleagues at the highest levels involved in antiviral research to graduate students and postdocs embarking on their careers, in a highly positive and constructive way.

Our Past President Bob Buckheit and his scientist wife Karen recently spent quality time with Mark and his wife Susan at the DART HIV meeting in Cabo. Sitting poolside during a break, Susan mentioned how Mark always ended up getting tied up in conversations with colleagues during the breaks and in his semi-retirement he was just as busy as he always was. We also talked about how much he enjoyed being in Florida but never tired of Montreal. "Whether we were talking about new mechanisms of HIV resistance or the political fight against AIDS around the world, Mark was always forthright in offering his opinions, asking what you thought and engaging on both a scientific and social level such that you always felt good about talking to him" said Bob Buckheit.

Mark gave the Gertrude Elion Distinguished Lecturer Award at the meeting in Cabo and he spoke on the topic of scientific discoveries that transformed HIV into a manageable disease. "I will always remember the interactions Mark had with the investigators in the room at a scientific conference – he'd say hello to everyone, he was always upbeat and positive and just happy to be in the room with his friends and colleagues. He will be sorely missed!" Mark was equally helpful and supportive of trainees. "I feel very fortunate to have known Dr. Wainberg", says Karen. "As a young scientist, the thought of presenting data and having a scientific conversation with a leader in the HIV field is somewhat intimidating! Through many poster sessions, conversations and professional interactions through our organizations, Dr. Wainberg always made me feel like what I did was just as important as what he did. At posters, he always approached me with an engaging smile and had excitement for the work he was reviewing which gave a first-time poster presenter a lot of confidence, which was until that moment lacking! He was very positive about the data and if something didn't seem quite right he didn't tell you it was incorrect but asked a question that made you understand why there could be a different answer." Without a doubt, the HIV field has lost a very special mentor who was an unrelenting advocate for young scientists on every level.

The community of virologists and antiviral researchers is deeply affected by Mark's untimely death. He will always be remembered as a warm, approachable and collegial collaborator, who always took the time to engage in thoughtful discussions. On behalf of the International Society for Antiviral Research we extend our condolences to Mark's wife, the former Susan Hubschman, his son Zev, an associate professor of medicine at UCLA, his other son Jonathan, his grandchildren, and all of the Wainberg family. Dr. Mark Wainberg will live on through his important research and advocacy that have helped so many AIDS patients and others throughout the world.

UPCOMING MEETINGS OF INTEREST

(Mike Bray)

Second International Meeting on Crimean-Congo Hemorrhagic Fever (CCHF)

The conference is sponsored by Aristotle University and will be held at the Makedonia Palace Hotel in Thessaloniki, Greece on 10-12 September, 2017. It will give scientists from around the world the chance to exchange information on all aspects of CCHF virus infections of ticks, animals and humans and to report new findings. There will also be the opportunity to compare CCHF with other types of viral hemorrhagic fever and to discuss common approaches for prevention and therapy.

The city of Thessaloniki has a rich culture, with more than 3000 years of history and many attractive places to visit. For more information, contact Dr. Anna Papa at annap.med@gmail.com or go to the website http://www.med.auth.gr/cc-conference-2017

4th Annual Global Virus Network Short Course in Medical Virology

Each year the GVN sponsors a one-week intensive course on basic, translational, and clinical aspects of viruses of importance to human health. This year's course will be held on 13-19 August at the Institute of Human Virology at the University of Maryland School of Medicine and the Johns Hopkins School of Public Health in Baltimore, Maryland.

The course will benefit early-career scientists and physicians who wish to broaden their skills in medical virology. The lecturers are leading experts drawn from GVN Centers. Didactic instruction will focus on state-of-the-art research on specific viruses. Students will meet and interact with leaders in medical virology, policymakers and NIH program officials.

From 15-20 applicants will be selected for the course. Candidates may be students in Ph.D. or MD programs, postdoctoral fellows, research associates or assistant professors. The key criteria for selection include professional and academic accomplishments and the likelihood of future contributions to the field

of virology. For more information, contact Natalia Mercer at nmercer@gvn.org, or go to the GVN website http://gvn.org/4th-short-course/ .

ISAR News is an official publication of the International Society for Antiviral Research. It is published four times a year as a free article in *Antiviral Research* (http://www.journals.elsevier.com/antiviral-research) and is posted on the ISAR website (http://www.isar-icar.com). Except where stated otherwise, all photographs are published with permission from ISAR.

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