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Editorial

Foreword to the Virus Research Special issue on “Retroviral RNA, protein co-factors and chaperones”

After 14 years of intensive research since the first International Retroviral Nucleocapsid Symposium (IRNCS) in the USA, the latest results and ideas related to retroviral nucleocapsid (NC) proteins and functionally similar RNA chaperone proteins in other viruses such as Flaviviruses and Coronavirus were presented at the 8th IRNCS. The Symposium was held in Barcelona, Spain on September 18–21, 2011 at the contemporary art museum CaixaForum. The team of organizers (Jose Maria Gatell, Robert Gorelick, Sebastien Lyonais, Delphine Muriaux, Karin Musier-Forsyth, chaired by Gilles Mirambeau) was able to set the stage for a few days of pioneering science in a highly stimulating atmosphere. The NC protein is central to early and late steps of the retroviral replication cycle. With the integration of modern biology and powerful biophysical and new microscopic methods, an impressive output is generated leading to an improved understanding of the diverse NC functions in virus replication and dissemination. This special issue of Virus Research is composed of contributions by invited speakers at this Symposium.

This IRNCS Symposium has become a real tradition since the initial meeting in Frederick, MD, USA in 1998 hosted by Larry Arthur and Louis Henderson. A series of meetings have been held since in Lyon, France in 1999 (Jean-Luc Darlix), Annapolis, MD, USA in 2001 (Larry Arthur), Strasbourg, France in 2003 (Yves Mély), Montreal, Canada in 2005 (Lawrence Kleiman), Amsterdam, the Netherlands in 2007 (Ben Berkhour), Minneapolis, MN, USA in 2009 (Lou Manksy) and the 8th IRNCS in Barcelona, Spain with local host Gilles Mirambeau.

The 8th IRNCS Symposium registered 96 participants from 18 countries (47 from Europa, 38 from North America, 9 from Asia, 1 from Australia and 1 from the Middle East), with 37 females and 59 males (Fig. 1). Two Keynote lectures focused on two important aspects of the AIDS/HIV field: the natural history of HIV dissemination (presented by Nobel laureate Françoise Barré-Sinoussi of the Pasteur Institute in Paris) and the coordination of HIV virion assembly, budding and maturation (presented Hans-Georg Kräusslich of the University of Heidelberg). Other presentations were delivered by 32 invited speakers and 15 abstracts were selected for an oral presentation. The diverse contributions to the NC field were covered in six sessions: “From translation to assembly” with Suzanne Sandmeyer, Théophile Ohlmann, Kathleen Boris-Lawrie, Andrew Mouland, Leslie Parent, Alan Rein, Delphine Muriaux and Hugues de Rocquigny, “Interaction with cellular factors” with Eric Freed, Kuan-Teh Jeang, Yeng Hui Zheng and Lawrence Kleiman, “RNA chaperones between biology and physical-chemistry” with Jean Luc Darlix, Karin Musier-Forsyth, Ioulia Rouzina, Luis Enjuanes, Yves Mély and Jean-Christophe Paillart, “NC between PR & RT” with Johnson Mak, Gilles Mirambeau, Judith Levin and Robert Gorelick, “Resonance, stretching, shaping, tapping & HiRes imaging” with Michael Summers, Jakob Grohman, Marc Williams, Carine Tisné, John Briggs, Lou Mansky, Mauricio Mateu and Sebastien Lyonais, and “HIV transversal research” with Ben Berkhour, Larry Arthur and Jeff Lifson. Louis Henderson presented his retrovirus and HIV-1 NC inspired art during the meeting and a lively poster session with 23 presentations completed the conference.

This collection of retrovirus-related papers by invited speakers at the 8th IRNCS symposium will be presented in two special issues of Virus Research. This first part (issue 2, volume 169, 2012) contains contributions on themes like the role NC in reverse transcription by Carine Tisné and RNA primer annealing by Lawrence Kleiman, a comparison of the chaperone activities of NC and the HIV-1 Tat protein by Yves Mély and a comparison with Vif protein by Jean-Christophe Paillart, but also a study on chaperones encoded by West Nile virus by Jean-Luc Darlix. Studies on the development of drugs are included concerning the NC protein by Maurizio Botta and the viral capsid by Mauricio Mateu. Other topics include a focus on the role of Matrix protein by Michael Summers, the genetic diversity of HIV-1 by Johnson Mak, the role of stress granules in virus replication by Andrew Mouland and the presence of microRNAs inside HIV-1 virion particles by Ben Berkhour.

The second part (issue 2, volume 171, 2013) also contains a range of topics including a mutational analysis of the HIV-1 NC protein by Robert Gorelick, mapping of a high affinity RNA binding site in the BLV NC protein by Michael Summers as well as HIV-1 reverse transcription between NC-mediated RNA condensation and Vpr-mediated DNA bridging by Gilles Mirambeau. The theme of NC-mediated RNA packaging in virions is extended towards intracellular Gag trafficking by Leslie Parent and towards the Ty3 retroelement by Suzanne Sandmeyer. Retroviral particle assembly is the focus of two reports delivered by Delphine Muriaux and Alan Rein. The retroviral RNA forms the core of chapters on reverse transcription by Judith Levin, RNA helicases by Kuan-Teh Jeang and mRNA translation by Théophile Ohlmann.

The 9th IRNCS is now in preparation and will take place in Montreal, Canada on August 25–28, 2013. This meeting will be organized by an international team chaired by Andrew Mouland and Karin Musier-Forsyth. We strongly encourage scientists working on viral chaperone proteins and RNA molecules, especially young researchers, to participate in this symposium (www.NCsymposium2013.org). Let this special Virus Research issue form a primer for the range of topics one can expect at this
A few words of thank. First of all, a tribute has to be paid to the two leaders of the NC field, Larry Arthur and Jean-Luc Darlix, who initiated the IRNCS meetings in 1998 in the USA and succeeded in shaping an international and dynamic NC research community.

The Barcelona meeting was supported by 16 sponsors: local (Gen-cat, La Caixa Obra Social, HIVACAT, Biocat International Centre of Scientific Debate, Fundacio de la Lluita Contra la SIDA, IDIBAPS), Spanish (MICINN, Fundacion Ramon Areces, CoRIS), French (Agence Nationale de Recherches sur le SIDA, SIDACTION), United States (NIH Office of AIDS Research, SAIC Frederick, RNA Society) and two South-European Biotech companies (Synprosis, France, and Diatheva, Italy). We especially thank Robert Gorelick for his continuous support in the organization of IRNCS meetings. We thank Louis Henderson not only for discovering the NC zinc fingers, but also for exposing his marvellous artwork that helps us all to visualize retroviruses, from complete virion particles to molecules of NC. We acknowledge Sebastien Lyonais for a suitable adaptation of Lou Henderson's virions (Fig. 2). We thank Luis Enjuanes, editor in chief of Virus Research, for generously offering the possibility to constitute this special issue.

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