

## INTRODUCTION

Dear readers,

In the year 2013 the Institute of Virology of the Slovak Academy of Sciences (IVSAS) is commemorating the 60th anniversary of its establishment. Since this initial setup, scientists at IVSAS have constantly been exploring contemporary problems of virology, rickettsiology, and most recently oncology, and their investigations have brought results that have been published in prestigious scientific journals with an impact on the global virus research.

Editorial office of the international journal *Acta Virologica* has been an integrated part of the Institute since 1957. Over the years of this coexistence, the journal has become a platform for publishing the important findings of our researchers as well as authors from abroad. This special issue of *Acta Virologica* consists of minireviews focused on an overview of the current research subjects and activities of IVSAS researchers in the context of worldwide scientific progress.

The internationally credited findings of our scientists are exemplified by the discovery of the herpesvirus isolated from the small rodents in the early 80th by the “father” of Slovak virology Dionýz Blaškovič and his colleagues (Blaškovič *et al.*, 1980). The virus, known today as the murine herpesvirus 68 (MHV-68), is a well-recognized model for the study of human oncogenic gammaherpesviruses. MHV research is currently concentrated at the Department of Molecular Pathogenesis of Viruses as well as at the Chair of Microbiology and Virology, Faculty of Natural Sciences at the Comenius University, the virological section of which is located at IVSAS. Current knowledge on the biological and pathogenic properties of various isolates of the murine gammaherpesviruses and their implications for the understanding human oncogenic gammaherpesviruses is reviewed in this issue of *Acta Virologica* by Čipková-Jarčušková *et al.* (2013).

Dionýz Blaškovič (whose 100th birthday will be memorialized in 2013) was not only an excellent scientist but also a founder and visionary leader of the Institute of Virology. Together with his colleagues, he predetermined the main research activities of the Institute for the decades that followed. Nowadays, IVSAS research is structured in six scientific departments with various topics of interest.

Influenza virus research represents the most traditional field of investigation at the IVSAS from the beginning till the present times, when it has become the core activity of the Department of Orthomyxovirus Research. The main

emphasis is on the study of new aspects of the pathogenic mechanisms of influenza A viruses and immune responses to conserved viral antigens. This work creates a basis for the applied research related to influenza diagnostics and vaccine development. The main activities of the department are summarized in the review by Varečková *et al.* (2013), depicting the role of HA2 glycopolyptide in antiviral immunity, and in the paper by Košík *et al.* (2013), describing PB1-F2 protein as an important component of influenza virus affecting its pathogenic properties. The third review in this series, focused on the RNA polymerase of influenza A virus was written by the internationally recognized expert, our former colleague and current collaborator Ervin Fodor from the Sir William Dunn School of Pathology, University of Oxford (Fodor, 2013).

Part of influenza virus research is also ongoing at the Department of Molecular Pathogenesis of Viruses, where it is concentrated around two major subjects, i.e. molecular mechanisms determining the function of ion channels of influenza viruses and on surveillance of avian influenza viruses in migratory birds, waterfowl and terrestrial birds in Slovakia. Recent trends exploiting RNA interference in influenza research are presented in the article Betáková and Švancarová (2013).

As mentioned above, the work of the Department of Molecular Pathogenesis of Viruses involves the study of herpesviruses. Main research interests are centred on gammaherpesviruses, i.e. MHV, Kaposi's sarcoma-associated virus (KSHV), and Epstein-Barr virus (EBV), particularly from the angle of gene analogues functionally implicated in the pathogenesis of KSHV and EBV. Perspectives of this research in the framework of current knowledge are provided in the review by Kúdelová *et al.* (2013). Moreover, IVSAS has left a significant label on Marek's disease virus research and the current status in this field is presented by Zelník *et al.* (2013). Additional activities are related to applied research, namely to the development of methods for detection of herpesvirus co-infections and to preclinical testing of various antiviral compounds. The role of interferon lambda in antiviral defence is reviewed here by Lopusná *et al.* (2013).

Since its foundation, the Institute of Virology has been involved in the epidemiological and pathogenic study of tick-borne and rodent-transmitted viruses and has made several original contributions mainly to understanding the ecology of these viruses. Nowadays, the Department of Virus

Ecology still investigates tick-borne and rodent-transmitted infections, primarily focusing on emerging hantaviruses, which represent a serious health problem for both humans and animals. This important subject, highly attractive also for the international research community, has been studied at IVSAS for several years in the close cooperation with the Institute of Medical Virology, Charite in Berlin. An overview of the current situation in Hantavirus spread across the central Europe is provided by Klempa *et al.* (2013). The presently well-accepted concept of non-viremic transfer of infectious agents by ticks via their saliva was originally introduced by Milan Labuda and co-workers at IVSAS (Labuda *et al.*, 1993). A summary of current knowledge on the non-viremic transfer of tick-borne viruses is provided by Havlíková *et al.* (2013). However, ticks are not only vectors for virus transmission but the components of their saliva can weaken or prevent the immune response of the host organism and can thereby facilitate the virus spreading in the body. Several aspects of the immunomodulatory molecules and effects of the tick saliva are described by Štibraniová *et al.* (2013).

Research on *Rickettsia* spp., *Coxiella burnetii* and related microorganisms has been ongoing at IVSAS for decades and its success is well documented by the number of unique results, such as the discovery of *Rickettsia slovaca* (Řeháček *et al.*, 1976). The current activities of the Department of Rickettsiology are directed more towards molecular characterization of *Rickettsiae*, *C. burnetii* and related microorganisms by methods of genomics and proteomics. An update on IVSAS research in this area is presented in the paper of Sekeyová *et al.* (2013). Great attention at the department is also paid to the exploitation of modern proteomic approaches for the identification of biomarkers for detection of *C. burnetii*. This research line is described in a review by Toman *et al.* (2013).

The Department of Plant Virology is involved in basic research but also has a strong tradition and application potential in its collaboration with the domestic agricultural sector. Besides isolation of new plant viruses, such as red clover mottle virus and pea green mottle virus, several diagnostic methods for the detection of viruses in plants and seeds were developed at IVSAS (Musil *et al.*, 1966; Valenta *et al.*, 1969). Recent achievements of the department particularly in the molecular studies of the plum pox virus are included in the review article by Šubr and Glasa (2013).

The Department of Molecular Medicine integrates the approaches of molecular and cellular biology, virology and experimental oncology in the investigations of fundamental processes linked with viral infections and tumor progression as well as in the development of their translational aspects. The main emphasis is on understanding molecular and functional properties of the carbonic anhydrase IX (originally named MN), a worldwide accepted marker of tumor hypoxia and promising target for anticancer therapy, which

was identified and cloned at IVSAS (Závada *et al.*, 1993; Pastorek *et al.*, 1994). A current overview of the processes regulating the expression of CA IX protein on the surface of tumor cells and thereby modulating its function is presented in the paper by Zaťovičová and Pastoreková (2013). An additional tumor-related subject of research at the department is a calcium-binding protein S100P, which is attracting attention as both an intracellular and extracellular signalling molecule participating in tumor biology as reviewed by Tóthová and Gibadulinová (2013).

From the virological point of view, research at the Department of Molecular Medicine focuses on the lymphocytic choriomeningitis virus (LCMV), a neglected viral pathogen causing mostly asymptomatic persistent infections. However, LCMV can be reactivated by immunosuppression and hypoxia (as described by IVSAS researchers) and can become dangerous. The dark side of the LCM virus, explained on the background of current knowledge, is described by Lapošová *et al.* (2013).

Over the last decade, the Institute has paid increasing attention to translational research and applications of basic research results in medical practice, and has therefore supported cooperative efforts with industrial partners from biomedical and pharmaceutical backgrounds through participation in common applied research projects. One of these is presented in the paper of Betáková *et al.* (2013) giving a short overview of the production and testing of measles and mumps vaccines.

Taking into account the list of contributions, we believe that this special issue of *Acta Virologica* will give the readers not only an overview of research activities but will also provide the informative views on several interesting scientific topics currently being investigated at the Institute of Virology, at the Slovak Academy of Sciences.

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## References

- Betáková T, Svetlíková D, Gocník M (2013): Overview of measles and mumps vaccine: origin, present, and future of vaccine production. *Acta Virol.* 57, 91-96.
- Betáková T, Švančarová P (2013): Role and application of RNA interference in replication of influenza viruses. *Acta Virol.* 57, 97-104.
- Blaškovič D, Stančeková M, Svobodová J, Mistríková J (1980): Isolation of five strains of herpesviruses from two species of free living small rodents. *Acta Virol.* 24, 468.
- Čipková-Jarčušková J, Chalupková A, Hrabovská Z, Wágnerová M, Mistríková J (2013): Biological and pathogenetic characterization of different isolates of murine gammaherpes-

- virus (MHV-68) in context to study of human oncogenic gammaherpesviruses. *Acta Virol.* 57, 105-112.
- Fodor E (2013): The RNA polymerase of influenza A virus: mechanisms of viral transcription and replication. *Acta Virol.* 57, 113-122.
- Havlíková S, Ličková M, Klempa B (2013): Non-viraemic transmission of tick-borne viruses. *Acta Virol.* 57, 123-129.
- Klempa B, Radosa L, Kruger DH (2013): Broad spectrum of hantaviruses and their hosts in Central Europe. *Acta Virol.* 57, 130-137.
- Košík I, Hollý J, Russ G (2013): PB1-F2 expedition from the whole protein through the domain to aa residue function. *Acta Virol.* 57, 138-148.
- Kúdelová M, Halássová Z, Košovský J, Lapuníková B, Pančík P, Režuchová I, Šuplíková M, Zelník Z (2013): Recombinant herpes viruses as tools for the study of herpes virus biology. *Acta Virol.* 57, 149-159.
- Labuda M, Jones LD, Williams T, Danielova V, Nuttall PA (1993): Efficient transmission of tick-borne encephalitis virus between cofeeding ticks. *J. Med. Entomol.* 30, 295-299.
- Lapošová K, Pastoreková S, Tomášková J (2013): Lymphocytic choriomeningitis virus: invisible but not innocent. *Acta Virol.* 57, 160-170.
- Lopušná K, Režuchová I, Betáková T, Škovránová L, Tomášková J, Lukáčiková L, Kabát P (2013): Interferons lambda a new cytokines with antiviral activity. *Acta Virol.* 57, 171-179.
- Musil M (1966): On the occurrence of the red clover mottle virus in Slovakia. *Biologia* 21, 663-670.
- Pastorek J, Pastoreková S, Callebaut I, Mornon JP, Zelník V, Opavský R, Zaťovičová M, Liao S, Portetelle D, Stanbridge EJ *et al.* (1994): Cloning and characterization of MN, a human tumor-associated protein with a domain homologous to carbonic anhydrase and a putative helix-loop-helix DNA binding segment. *Oncogene.* 9, 2877-2888.
- Řeháček J, Kováčová E, Kováč P (1976): Rickettsiae belonging to the spotted fever group from ticks in the Tribec Mountains. *Folia Parasitol* 23, 69-73.
- Sekeyová Z, Socolovschi C, Špitalská E, Kocianová E, Boldiš V, Quevedo Diaz M, Berthová L, Boháčsová M, Valáriková J, Edouard Fournier P, Raoult D (2013): Update on Rickettsioses in Slovakia. *Acta Virol.* 57, 180-199.
- Štibráňová I, Lahová M, Bartíková P (2013): Immunomodulators in tick saliva and their benefits. *Acta Virol.* 57, 200-216.
- Šubr Z, Glasa M (2013): Unfolding the secrets of Plum pox virus: from epidemiology to genomics. *Acta Virol.* 57, 217-228.
- Toman R, Škultéty L, Palkovičová K, Florez-Ramirez G, Vadovič P (2013): Recent progress in glycomics and proteomics of the Q fever bacterium *Coxiella burnetii*. *Acta Virol.* 57, 229-237.
- Tóthová V, Gibadulinová A (2013): S100P, a peculiar member of S100 family of calcium-binding proteins implicated in cancer. *Acta Virol.* 57, 238-246.
- Valenta V, Gressnerová M, Marcinka K, Nermut MV (1969): Some properties of pea green mottle virus, a member of the cowpea mosaic group, isolated in Czechoslovakia. *Acta Virol.* 13, 422-434.
- Varečková E, Mucha V, Kostolanský F (2013): HA2 glycopolypeptide of influenza A virus and antiviral immunity. *Acta Virol.* 57, 247-256.
- Zaťovičová M, Pastoreková S (2013): Modulation of the cell surface density of the carbonic anhydrase IX by shedding of the ectodomain and by endocytosis. *Acta Virol.* 57, 257-264.
- Závada J, Zavadová Z, Pastoreková S, Čiampor F, Pastorek J, Zelník V (1993): Expression of MaTu-MN protein in human tumor cultures and in clinical specimens. *Int. J. Cancer* 54, 268-274. <http://dx.doi.org/10.1002/ijc.2910540218>
- Zelník V, Lapuníková B, Kúdelová M (2013): Marek's disease: rapid progress in research with unclear biological implementations. *Acta Virol.* 57, 265-270.

## REMARK

This special issue did not undergo a reviewing process typical for *Acta virologica*. The issue were subjected just to formal editing. Therefore the Editor-in-Chief of *Acta virologica* does not take responsibility for the scientific content of this issue.

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*Editor-in-Chief of Acta Virologica*