Pavle R. ANĐUS*

AN EXAMPLE OF A GOOD AND SUSTAINABLE INTERNATIONAL COOPERATION — BIOPHYSICS SCHOOL „ACADEMICIAN RADOSLAV K. ANDJUS“

Abstract: After organizing a successful international Biophysics congress at Sveti Stefan dedicated to Radoslav K. Andjus (1926–2003), the founder of Serbian Biophysics and the leader of the Belgrade School of Physiology, in 2006 the members of the Yugoslav Biophysical Society decided to honor the academician Andjus (he was member of both Serbian and Montenegrin Academies) by establishing a biennial series of international Biophysics schools & workshops dedicated to his memory. Since then 8 Schools have been organized. The main concept was that this is an international event organized at Montenegro coast with the mutual core organization by colleagues from Serbia (Biophysical Society and Faculty of Biology University of Belgrade) and Montenegro (Institute of Marine Biology, Kotor). Co-organizers were usually distinguished scientists from abroad. Since the topics of the School were often tackling Neurobiophysics the School coined its acronym „NERKA“ (**NE**uro **R**adoslav **K A**ndjus). The School remains a lighthouse of collaboration between Serbia and Montenegro attracting international peers, experts as well as young participants.

INTRODUCTION

Radoslav Krstov Andjus (1926–2003) was one of the main proponents of the Belgrade School of Physiology and the founder of the Serbian Biophysics. He was member of the Serbian (elected age 33) and Montenegrin academies of sciences and arts. He was one of the founders of the Institute for Marine Biology in Kotor. His roots are in his fatherland — Paštrovići and Sveti Stefan of the Montenegrin coast. He is buried at the graveyard

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of monastery Praskvica, above the Miloćer park with a beautiful view of Sveti Stefan.

After organizing a successful international Biophysics congress at Sveti Stefan (Proceedings published in the Annals N. Y. Acad. Sci. Vol 1048 2005) dedicated to Radoslav K. Andjus, in 2006 we from the Yugoslav Biophysical Society decided to honor academician Andjus by organizing an international Biophysics school & workshop dedicated to his memory, with the intention to establish a biennial series. Since then 8 Schools have been organized. The main concept was that this is an international event organized at Montenegro coast with the mutual core organization by colleagues from Serbia (Biophysical Society and Faculty of Biology University of Belgrade) and Montenegro (Institute of Marine Biology, Kotor). Co-organizers were usually distinguished scientists from abroad. Since the topics of the School were often tackling Neurobiophysics the School coined its acronym NERKA (**NE**uro **R**adoslav **K A**ndjus).

NERKA 1 (2006)

The International Workshop „Imaging in Neurosciences and Beyond" was held at Sveti Stefan (Montenegro) September 23–30, 2006. The Workshop was organized by the Faculty of Biology, University of Belgrade and the Yugoslav Biopohysical Society. There were 30 participants

NERKA 1. Organizers and lecturers of the First NERKA in a visit to Budva old town.

— 10 students with fellowships, and 7 published papers in the workshop proceedings on a CD. Five papers were chosen by the program committee for oral section presentations. There were 12 invited speakers who also prepared handouts for the participants some of which could be obtained prior to the meeting at an internet site. Participants were from Belarus, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Russia, Serbia, Slovenia, and USA.

The program consisted of three sections dealing with MRI, advanced microscopy, and imaging in electrophysiology. Each working day was summed up in the evening at a panel discussion with speakers and participants. Finally, a written exam was given to the interested participants and a diploma for 3 ECTS credits verified by the Faculty of Biology, University of Belgrade was given to the ones that past. Six students applied and past the exam.

NERKA 2 (2008)

In 2006 Montenegro got its independence, and the organization of NERKA had to be transferred to Belgrade. However, this was considered only a temporary solution with the remaining initial goal to sustain the collaboration between the two academic environments.

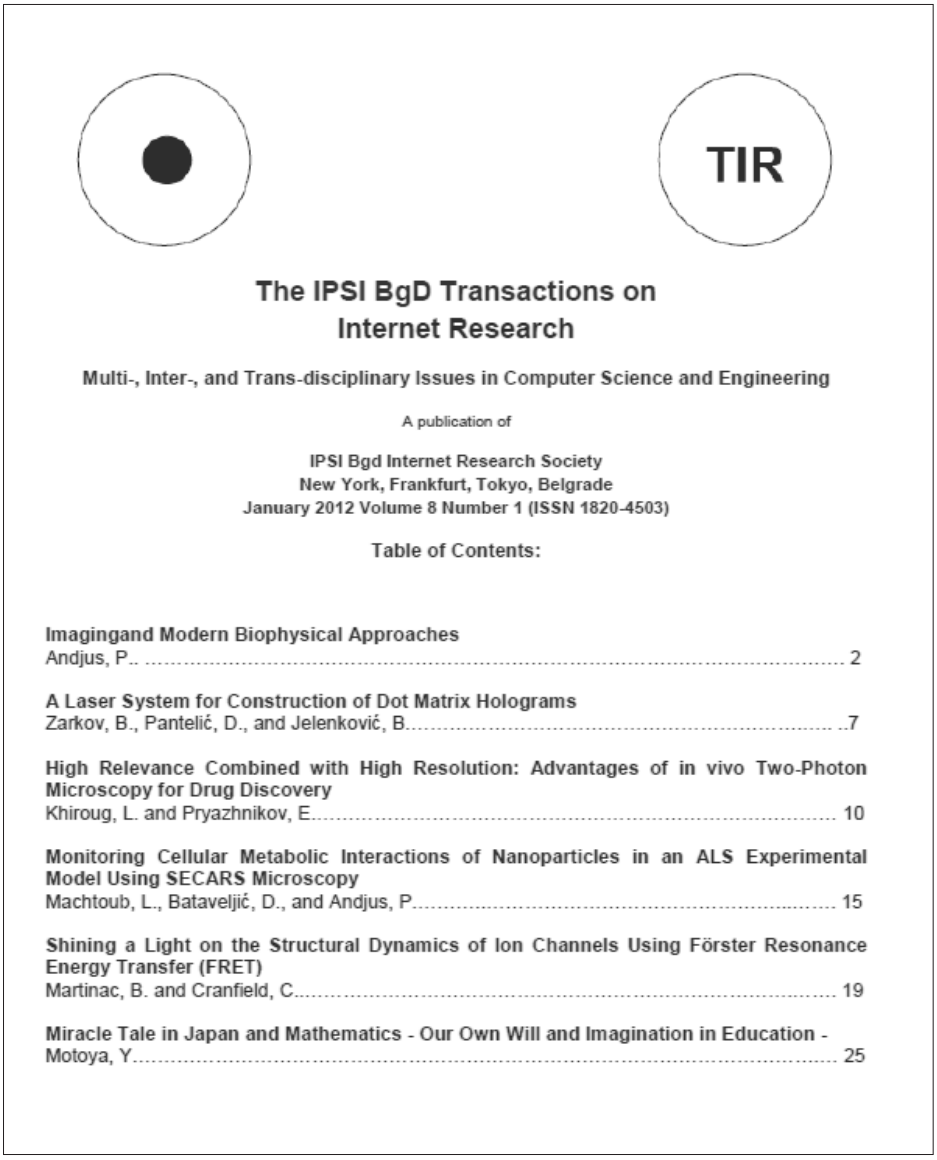
The Workshop „Neuroimaging and complementary techniques" was organized by twining with the Training School of the EC COST Action B30 („Neural Repair and Plasticity"). It was also organized in cooperation with the Society for Neurosciences of Serbia (that also recruited speakers) and with two academic institutions in the country, School of Biology, and Institute for Biological Research „Siniša Stanković" both part of University of Belgrade (that offered their labs and lecture halls).

In addition to the main approaches in neuroimaging (as established at the 2006 School) this time in addition to high quality lectures emphasis was given also to practical courses. Students entered MRI clinical facilities, histology and electrophysiology labs. They were then given practical courses at these facilities and later the students went through hands-on courses in any of the offered facilities.

NERKA 3 (2010)

In December 2010 NERKA returned to Montenegro. With the help of Dr Veljko Milutinović and his IPSI team a workshop on „Imaging and Modern Biophysical Approaches" was organized at Pržno-Miločer. Several distinguished lecturers from over the world gathered in the hotel „Residence" and

NERKA 2. Clasroom (Faculty of Biology, Belgrade), and groop photo in front of the venue in Belgrade.



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NERKA 3. Front page of IPSI BgD Transaction dedicated to the talks from the Workshop.

as a special dinner social celebrated the coming New Year 2011. After the workshop a special volume of IPSI BgD Transactions was issued (see abow).

NERKA 4 (2012)

The International Workshop: „Methods on the interface of Neurochemistry and Electrophysiology" was again organized in Belgrade (August/September, 2012) since it was considered convenient to twin with the *Regional Biophysical Conference 2012* in Kladovo, Serbia (September, 2012). It was also be organized in cooperation with the Biophysical Society of Serbia and with the Faculty of Biology, and Institute for Biological Research „Siniša Stanković" both part of University of Belgrade (that offered their labs and lecture halls). Also included in the organization of the Workshop there were the Military Medical Academy and the Faculty of Physical Chemistry as well as the Institute of General and Physical Chemistry.

This Workshop should deal with techniques (lectures and practicals) on the interface of Neurochemistry and Electrophysiology and their applications in Neurosciences:

1) Magnetic resonance spectroscopy and transcranial magnetic stimulation
2) Imaging of ions and molecules in electrophysiology
3) Neuroelectrochemistry on tissue samples
4) Chemical tracing of transmitter electrophysiological responses and their modulation by ecto- and endo-phosphatases.

The School as well as the Regional Conference were supported by European and International Biophysics societies (EBSA and IUPAB) and the Ministry of Education and Science Rep. of Serbia.

NERKA 5 (2014)

This School was meant to be organized on the occasion of the International Year of Light and was entitled „NEUROPHOTONICS — Towards the International Year of Light and Light-based Technologies 2015" and it was coorganized with the Photonics Center of the Institute of Physics, University of Belgrade. Foreign organizer was Ivan Milenković from Faculty of Medicine, University of Leipzig.

After a selection process 25 students were invited to the School. 13 where from abroad (Argentina, India, Italy, Netherlands, New Zeeland, Poland, and Turkey) and 12 from Serbia. Other local students were also invited for lectures only. There were 14 2–3h lectures by experts from Croatia, Germany, Italy, Serbia, Spain, Sweden, and USA. Lectures were intertwined with hands-on and practical sessions. There was a special lecture with discussion on Ethical use of animals in neuroscience given by the head of the Ethics Council of Republic of Serbia.

NERKA 5. Prof. Andjus with some international students at a get-together (upper left). Hands-on session at Institute of Physics (upper right). Group photo in front of the venue.

There were many get-together occasions to discuss and meet the speakers. A farewell dinner was organized at the end.

Finally the students were given certificates and filled in an anonymous evaluation test. The evaluation test showed that the students strongly agree (70%) or just agree (30%) that the School was a success.

In addition to the International Brain Research Organization (IBRO) funds the School was also supported by the Ministry of education, science and technological development Republic of Serbia.

NERKA 6 (2016)

For the Summer School „Imaging neuroinflammation" organized in June, 2016 NERKA finally returns to the in Kotor. This School was, organized traditionally by the Biophysical Society of Serbia, co-organized by the Faculty of Biology, University of Belgrade, Institute of Marine Biology as the local organizer and with the fellowships sponsored by the International Union for Pure and Applied Biophysics (IUPAB).

The topic of the School was to introduce modern methods of biophysical imaging and image analysis in studies of inflammatory phenomena and markers of neurodegenerative diseases. It was also envisaged to raise discussion among the participants on the translational value of these techniques and the clinical relevance of presented experimental markers. The techniques covered were MRI, MRS, PET, EPRI, and advanced microscopy (non-linear microscopy- dual photon fluorescence, Fluorescence correlation spectroscopy & microscopy, PALM, STED, CARS, digital holographic microscopy). A multidisciplinary faculty was chosen ranging from fields of physics (applications of laser technology and advanced microscopy), physical chemistry (magnetic resonance techniques and applications), biology (experimental models of neurodegenerative diseases), and medicine (clinical studies and markers of neuroinflammation).

There was a lineup of 13 expert speakers from Australia, Austria, Canada, Italy, Serbia, UK, and USA. The students were from 8 countries: Armenia, Bulgaria, Croatia, Hungary, Italy, Macedonia, Serbia and Slovakia. Altogether 33 students were registered. 15 students were awarded a fellowship on competitive basis.

NERKA 6. Group photo at the terrace of the Institute of Marine Biology, Kotor.

NERKA 7 (2018)

The topic of this School was „Mechanobiology“ and it was organized with the great help pf Dr Boris Martinac (who participated at NERKA 3) from Victor Chang Cardiac Research Institute, Sydney Australia. This School was organized in the wake of the 2021 Nobel prize in Physiology or Medicine given for the discovery of mechanosensitive Piezo channels to which Dr Martinac contributed significantly.

After a selection process, 24 students were invited to the School. Seven of these students where from abroad (Austria, Egypt, France, Slovakia, Slovenia

NERKA 7. A group photo at the terrace of the Institute of Marine Biology, Kotor (left). The faculty (Dr Boris Martinac sitting) at the famous church site behind the Institute (right).

and Turkey) and 13 from Serbia. Other local students were also invited for lectures. There were 12 1.5h lectures by experts from France, Greece, Hungary, Italy, Japan, Serbia, Spain, UK and USA. Lectures were intertwined with time dedicated to discussions and a discussion panel has also been organized on the Translational value of Mechanobiology (moderated by P. R. Andjus, B. Martinac, K. Radotić and K. Naruse).

There were two get-together occasions in the evening to discuss and meet the speakers and a farewell dinner preceded by a boat excursion at the end.

At the closing of the School the students were given certificates of participation and took an anonymous evaluation survey in addition to a personalized questionnaire.

In addition to the Biophysical Society the School was also supported by IBRO, IUPAB, EBSA, and COST.

NERKA 8 (2021)

The Covid19 pandemic prevented us to organize a School in 2020, however as soon as the situation bettered we boldly embarked on the organization of a School in 2021. It was a success.

The Summer Course was enttled „Ion Channels and Neuronal Excitability". It was organized by the Faculty of Biology University of Belgrade with the support of the European FENS-NENS PhD program on Neurobiology. This school covered the topic of Ion Channels and Neuronal Excitability — techniques, modeling, physiology & pathology. The foreign organizer of the School was Dr Marco Canepari from University of Grenoble, France.

We had 27 students from Serbia, N. Macedonia, Romania, Hungary, Turkey, Italy, Greece, Germany and Russia. Participants presented posters during the School. We made sure that students had enough time during breaks to get to know each other better and discuss with the lecturers the topics they covered in their lectures. The School Course was supported by FENS-IBRO, European Society of Neurochemistry, and companies CAIRN and LabEx ICST. Most of the participants received fellowships of different kinds.

There were 13 lectures by experts from France, Hungary, N. Macedonia, Italy, Serbia, UK and USA. Lectures were intertwined with the time dedicated to discussion. The final panel discussion treated some relevant questions of career development and stimulated a fruitful interaction of the participants and faculty.

NERKA 8. The Faculty at the church site (above; Dr M. Canepari, 2nd from the right). A group photo in front of the Institute of Marine Biology, Kotor.

CONCLUSION

One of the main achievements of this series of Schools is the sustained collaboration between Belgrade and Kotor and the revival of the intense academic exchange that was initiated and strongly developed from the very beginning of the foundation of the Institute of Marine Biology. This however with the ever present international component within instructors as well as students, with the ultimate goal to develop an international center for multidisciplinary research deeply embedded in the beautiful Bay of Kotor. Our endeavor was always fully supported by the staff and colleagues from the Institute of Marine Biology, particularly we would like to highlight here the unreserved collaboration of Drs Aleksandar Joksimović and Mirko Đurović.

Pavle R. ANĐUS

PRIMER DOBRE I ODRŽIVE MEĐUNARODNE SARADNJE — BIOFIZIČKA ŠKOLA „AKADEMIK RADOSLAV K. ANĐUS“

Sažetak

Nakon organizovanja uspešnog međunarodnog biofizičkog kongresa na Svetom Stefanu posvećenog Radoslavu K. Anđusu (1926–2003), osnivaču srpske biofizike i rukovodiocu Beogradske fiziološke škole, članovi Biofizičkog društva Jugoslavije su 2006. godine odlučili da odaju priznanje akademiku Anđusu (bio je član i SANU i CANU) osnivanjem bijenalne serije međunarodne biofizičke škole i radionice njemu posvećene. Od tada je organizovano 8 škola. Osnovna koncepcija je bila organizovanje međunarodnog događaja koji na Crnogorskom primorju, kao zajedničkom jezgru, organizuju kolege iz Srbije (Društvo za biofiziku i Biološki fakultet Univerziteta u Beogradu) i Crne Gore (Institut za biologiju mora, Kotor). Suorganizatori su obično ugledni naučnici iz inostranstva. Pošto su se teme škole često bavile neurobiofizikom, škola je dobila akronim „NERKA“ (**NE**uro **R**adoslav **K. A**nđus). Škola ostaje svetionik saradnje Srbije i Crne Gore, koji okuplja međunarodne saradnike, stručnjake kao i mlađe polaznike.