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Włodzimierz M.H. Kozak (1927–2010) in memoriam

Włodzimierz Maciej Hipolit Kozak has passed away over a year ago, on November 29th 2010 in Pittsburgh, Pennsylvania (USA). His wife Ewa Tumiel-Kozak and son Juliusz Aszot Kozak were at his death bed. At the time of death Włodzimierz Kozak was Professor Emeritus of Biomedical Engineering at the Carnegie-Mellon University in Pittsburgh. His ashes were brought to Poland and buried on Wawrzyszew Cemetery in Warsaw on May 20th 2011, in the presence of his wife, son, family and many friends, old and young, from the Nencki Institute.

Włodek (or Vlod) as his family and friends called him, was born on May 7th 1927 in Warsaw (Poland). Although he was only two when his father died, his childhood appears to have been very happy. He was the only child and was virtually adored by his mother (professional landscape designer) and his maternal Grandfather, a well-to-do builder and property developer, who acted throughout Włodek's childhood and adolescence as a father figure.

In spite of the tense relations between the 'resurrected' independent Poland and the Soviet Union, the effective successor of one of Poland's occupying powers (the Imperial Russia) that persisted throughout most of the 'between the wars' period, Włodek's Grandfather 'instilled' in his grandson a great love of both Polish and Russian languages and cultures. Indeed, to the end of his life, Włodek spoke almost faultless Russian and could recite large fragments from Alexander Pushkin's most famous poem, Evgenii Oniegin. Włodek was also a great admirer of the great Ukrainian-Russian satirical dramatist and novelist, Nikolai Gogol. This fascination with Gogol could have something to do with the 'ethnic identification' since Gogol was on his father's side a descendant of the Ukrainian Cossacks (in Polish – Kozacy) and on his mother's side descendant of Polish Nobility (Szlachta). More likely, however, Włodek simply loved Gogol's sense of humor and was able to quote at will in Russian, Polish, English or whatever language his interlocutors felt most comfortable with, Gogol's many sarcastic and at the same time witty and insightful pronouncements. Indeed, Gogol's most famous satirical play, *The Government Inspector* (*Revizor*) was probably Włodek's favorite theatrical play. Włodek loved also surrealistic humor of the contemporary Polish poet Konstanty Ildefons Gałczyński.

Włodek Kozak and Bogdan Dreher in the Office in the Nencki Institute of Experimental Biology, 1968

From an early age, Włodek exhibited tremendous aptitude for languages, mathematics, technical drawings as well as tinkering with mechanical and electrical gadgets. He had also a great talent for humorous mimicking of other human beings not only those in his immediate surroundings but also those in public domain. By the time I met him (mid' 1963) apart from Polish and Russian Włodek spoke rich, nuanced and only slightly accented, English. He was also fluent in French and German and had a good grasp of Latin. Indeed, he could recite from memory not only large fragments from Ovid's Metamorphosis and a number of Ovid's witty couplets but also some funny lampoons of Julius Cesar and Cicero ascribed to Catullus. Włodek often mischievously imitated the way in which most people attending the Latin Mass in the Catholic Churches mispronounced the Latin phrases thus revealing their complete ignorance of the message preached. Although Włodek had some knowledge of Classical Greek and at least a smattering of self taught Sanskrit, with the general decline of knowledge of Classical Greek (not to mention the Sanskrit), he had very little, if any, opportunity to make use of this knowledge. Throughout most of his life, Włodek loved playing with words and we had long sessions of 'puns' in Polish and Russian. Later on, during Włodek's visits in Australia or our meetings in US or Poland, he and I had long 'punning' sessions in English. Those sessions quite often drove the innocent bystanders mad.

In September 1939 at the beginning of the German invasion of Poland, Włodek (aged 12) and his mother moved permanently from Warsaw to a summer retreat built by Włodek's Grandfather in Rejentówka, a village near Warsaw. There he took private language lessons and studied overall high school curriculum. Włodek remarked frequently that one of the most famous Prussian Kings, Frederick the Great, one of the initiators and participants in the first partition of Poland in 1772, claimed to believe that Poles are descendants of ancient slaves. In the case of Frederick the Great his professed contempt for Poles was not genuine since it was accompanied by firm instruction to his successors to learn Polish. Indeed, all but the last Prussian King, Kaiser Wilhelm II, spoke fluent Polish. Nevertheless, many 19th century German nationalists (including another fluent Polish speaker, the so-called Iron Chancellor, Otto von Bismarck) and Nazi-inspired 20th century German anthropologists/sociologists argued that in order for German culture to exert its civilizing influence, the putatively slave-derived Polish culture, has to be destroyed. Consistent with these ideas, from the moment they occupied Poland Nazis conducted intense persecutions of Polish intellectual elites and closed not only all Polish Universities, Polytechnics and other institutions of higher learning but also the mere high schools. Indeed, teaching at, as well as an attendance at Polish high school or University classes was strictly forbidden. Taking private lessons in Rejentówka, Włodek largely avoided dangers associated with attending an illegal high-school, like forced labor or imprisonment in a concentration camp. However, Włodek's looks (dark eyes, black hair and olive skin) exposed him to

another, even more perilous danger not uncommon in countries occupied by the Nazis. Indeed, in 1995 Włodek told me that in 1943 (aged 16), he was a target of an attempted 'ethnic' blackmail (i.e. accusation of being a Jew in disguise at the time when being a Jew was a "crime" punished by an immediate execution or slightly postponed death in one of the extermination camps). Since Włodek was well known in the vicinity of Rejentowka and numerous bystanders vouched loudly for Włodek's impeccably "Aryan" pedigree, the blackmailers immediately apologized and quietly bid their retreat back to Warsaw.

During the German siege in September 1939, many buildings in Warsaw were destroyed by massive and indiscriminate bombardments from the air. This was followed by systematic ground-based destruction of the Warsaw Ghetto in April – June 1943 during and after the Warsaw Ghetto Uprising. Finally, during the Warsaw Upraising in August – October 1944, Warsaw was virtually depopulated by artillery shelling, air bombardments, shootings and total expulsion of the surviving population. Most of the central parts of the city were then systematically destroyed. At the same time, from August 1944 till January 1945, the Soviets who were nominally Poland's allies (as they were allies of UK and USA) were calmly watching the destruction of Warsaw from the other side of the Vistula River. Thus, when the war ended and Włodek matriculated in 1945, he had to enroll as a student at the University of Łódź (Lodz) rather than the Warsaw University that could not open at that time in the barren city.

In Lodz Włodek studied mathematics, philosophy, physics, biology and probably a few other subjects. Unlike his contemporary and later on an internationally famous philosopher and most scholarly and devastating critic of Marxism, Leszek Kołakowski, Włodek was never infatuated by Marxist philosophy. However, due to the shared interest in philosophy and overall intellectual curiosity, Włodek and Kołakowski were quite closely acquainted during the Lodz period. Like a number of other young bright biologists (e.g. Wacława Ławicka, Jan Brunner, Andrzej Zbrożyna) or freshly minted medicos (e.g. Elżbieta Fonberg, Bogusław Żernicki), Włodek became closely associated with the Department of Neurophysiology of the Nencki Institute of Experimental Biology which was temporally housed in Lodz due to destruction of Warsaw. The Department was headed by Professor Jerzy Konorski and Dr (later Professor) Liliana Lubińska. When in 1953–1955 the Nencki Institute had moved to its new premises in Warsaw, Włodek and many other 'youngsters' moved with it.

Włodek had a substantial interest in the theoretical issues underlying voluntary motor responses (type II or instrumental conditioned reflexes according to the original terminology of Jerzy Konorski and Stefan Miller, or operant behavior according to the later terminology of the American behaviorist B.F. Skinner). However, as an experimentalist par excellence, he concentrated on practical issues such as reliability and quantification of measurements of the strength of unconditioned and conditioned responses (cf. references 1 and 2 in Selected Bibliography).

Włodek took advantage of a substantial, albeit only temporary, political liberalization that occurred after the so-called "Polish October 1956" that ended Stalinism in Poland and applied for a Rockefeller Fellowship. Presumably due to support of Jerzy Konorski he was granted the Fellowship enabling him to work for a year in the laboratory of the prominent Australian neurophysiologist, Sir John Carew Eccles. In the early 1960s Eccles's laboratory in the John Curtin School of Medical Research at the Australian National University in Canberra was a sort of secular Mecca for young and dynamic neurophysiologists from all over the world who were interested in the integrative properties of mammalian spinal cord. Eccles' leadership and general atmosphere in the lab were truly inspiring. Not surprisingly, the relatively short period in Eccles laboratory resulted in five high-quality papers published in what we would call nowadays high-impact journals (papers 4–8 in the Selected Bibliography list). In addition to the two Journal of Physiology papers in which Sir John is a senior author (authors were listed alphabetically) Włodek co-authored three papers (two of them in Nature) with several Australian neurophysiologists (including Eccles' daughter, Rosamond M. Eccles). The work established foundations of the life-long friendship of Włodek with a talented Australian neurophysiologist – Rod Westerman. The papers described plastic changes of spinal responses in cats which underwent muscle tenotomy, denervation of synergic hind-limb muscles or chronic spinal cord isolation. Not surprisingly, taking the prominence of John C. Eccles (few years later, in 1963, he shared the Nobel Prize in Physiology or Medicine with two great British neurophysiologists – Alan Lloyd Hodgkin and Andrew Fielding Huxley), the papers were often cited. Indeed, within a short period of time each of them was cited more than 100 times. Taking into account that at that time the number of neuro-

physiological papers published every year was only a small fraction of the number of such papers published nowadays, it was not a trifle achievement.

Enthused by his first antipodean success Włodek decided to extend his stay in Australia. Eccles recommended Vlod to Peter Bishop, at the time Professor of Physiology at the University of Sydney, while Jerzy Konorski managed to convince the Polish Academy of Sciences (the overall boss of the Nencki Institute) to extend Włodek's unpaid study leave. The next 2.5 years spent in Peter Bishop's laboratory established Włodek's great international reputation in what we would call nowadays Visual Neuroscience. According to a number of young and not so young neurophysiologists working at the time in Bishop's laboratory, Włodek was instrumental in convincing Peter Bishop to abandon the just built Talbot's Multibeam Ophthalmoscope (used by Stephen W. Kuffler in his fundamental 1953 study of the functional organization of mammalian retina) and instead to present visual stimuli on the tangent screen in front of the animal. With this approach the animal's own optics was used to focus the stimuli on the retina. Indeed, this method has been later used very successfully by David H. Hubel and Torsten N. Wiesel (co-laureates with Roger W. Sperry of 1981 Nobel Prize in Physiology or Medicine) in their fundamental studies of the mammalian visual system.

In a series of papers published in the period 1962–1965 (papers 9–11 and 13 on the Selected Bibliography list) Vlod and his colleagues in Peter Bishop's laboratory in the Department of Physiology at the University of Sydney described some basic properties of cat's visual optics and spatial location of important landmarks in cat's retina such as optic disc and area centralis (presumed equivalents of primates' fovea) as well as the pattern of projection of visual field onto cat's dorsal lateral geniculate nucleus (LGNd), the principal dorsal thalamic visual relay nucleus. Most of the beautiful drawings of cat's eye, photographs of the retinal whole-mounts and visual field projections onto the LGNd were the handy work of Włodek. For the following 30 or 40 years, domestic cat with its easy availability, large frontally positioned eyes and sophisticated visual cortices containing many morphologically and functionally distinct areas, became one of the principal models driving research in the visual science and Włodek's work has been cited very often (see note below). Overall, this work became a basis of Włodek's PhD awarded to him by the University of Sydney in 1963. Tinkering, the practical side of Włodek expressed itself in building a perimeter and moving figure generator for vision research (paper 12 on the Selected Bibliography list). A number of years later, this apparatus was used by Yoshiro Fukada, Bob Rodieck (one of the co-builders of the apparatus) and myself in our 1976 study describing for the first time the high degree of anatomical segregation of different information channels in the LGNd of primates.

In Sydney, Włodek's personality and what Australian friends called his Polish charm conquered almost the entire Department of Physiology. This trace of his personality, together with his effortless erudition and humorous approach to supposed reality were winning him many friends everywhere. At the same time those traits attracted attention of many women, seemingly without his straining to get it, and resulted in the envy of some men. Apart from his research, and social interactions with people in the Department, Włodek travelled extensively around Australia, acquired a pilot license and was quite active in the Polish expatriate community. Indeed, for many years after Włodek left Australian shores, he was fondly remembered by many members of the Australian-Polish communities in Canberra and Sydney.

By the time Włodek returned to Poland (mid 1963), he was very well known in the international neurophysiological community. Shortly after his return, he gave a number of excellent seminars presenting his work done in Canberra and Sydney. In the Nencki Institute Włodek concentrated on establishing a visual neurophysiology laboratory and he made an excellent job of it. At the same time he managed to translate into Polish one of the basic books written by Sir John Eccles – The Physiology of Synapses – and wrote many articles about the vertebrate nervous system for the Polish Universal Encyclopedia. Furthermore, together with his close friend and colleague, Stefan Sołtysik they published an English-Polish dictionary of basic terms used in brain physiology and behavioral sciences (position 22 on the Selected Bibliography list).

Włodek, who like several other staff members lived on the Nencki's premises, was virtually omnipresent for scientific discussions, consultations and anti-establishment political jokes not only during lunches in the Institute's famous canteen but also well into the evenings. Not surprisingly, with his extremely friendly, open and 'anti-pompous' personality combined with his quick mind, broad knowledge of neurophysiology and a great

sense of humor, he became a favorite academic of all young science graduates starting their doctoral training in the Department of Neurophysiology of the Nencki Institute. Włodek's personality, multilingualism and intimate knowledge of architectural styles and history of every significant building in Warsaw that was painstakingly restored after destruction of the World War II, made him also a favorite guide of numerous distinguished as well as young and upcoming international visitors 'flocking' to interact with Jerzy Konorski and some of his pupils in the Department of Neurophysiology. In 1966 Włodek was awarded by the Nencki Institute of Experimental Biology the prestigious Doctor of Science (Docent) degree.

Establishment of a good visual neurophysiology laboratory required also development and implementations of basic computational facilities. Computer technologies applicable to biomedical research were at the time not available. Even in the Western countries, scientists had access to only a few and rather expensive computers. As they say, the necessity is the mother of invention and Włodek managed to convince a talented electronic engineer, Dr. T. Jankowski, to develop an electronic analyzer for averaging physiological responses of single neurons and neuronal clusters.

In September 1966, Professor Peter Bishop visited Nencki Institute and gave a fascinating lecture describing his and his colleagues' recent works on the neural mechanisms of stereoscopic vision. At the seminar as well as for several days afterwards I bombarded him with numerous questions concerning his work. Presumably prompted by Vlod, Professor Bishop invited me to Australia. A few years later, I accepted Professor Bishop's invitation and became a Post-doctoral Fellow in the Department of Physiology of the John Curtin School of Medical Research in Canberra and remained in Australia ever since.

In 1965 Włodek, who was earlier married to and then divorced from Dr. Wacława Ławicka from the Nencki Institute, married an Armenian neurophysiologist, Bella Harutiunian (later Bella Harutiunian-Kozak) whom he met at an earlier scientific meeting in Soviet Armenia. In January 1967 their son Juliusz Aszot Kozak was born. He is currently neuroscientist at the Wright State University in Dayton (Ohio, USA). Bella and Włodek (with substantial participation of several post graduate students, especially Krystyna Dec, one of the future leaders of the visual laboratory in the Nencki Institute) managed to conduct a series of very strenuous, long-lasting experiments and to present their results in a number of papers in which they quantitatively assessed (using ANOPS, the electronic analyzer developed by T. Jankowski) receptive field properties of single neurons in the cat's optic tectum (superior colliculus) and pretectal nuclei (positions 17–21 in the Selected Bibliography list).

However, by the time of publication of most of those papers Włodek was living abroad. The main reason for his departure was fear that vicious attacks on students and intellectuals demanding basic cultural freedoms that started in 1968 might result in curtailing possibilities of serious scientific research in Poland. Furthermore, Włodek was truly disturbed by the fact that the attacks organized by the so-far-relatively-liberal communists of the Polish United Worker's Party had strong anti-intellectual and anti-Semitic undertones.

For a year Włodek was a resident scientist in the Institute of Ophthalmology (associated with the University of London) and was hosted there by prominent British experimental ophthalmologist, Professor Geoffrey Arden. Bella and Aszot managed to join Włodek. However, Bella declined the opportunity to emigrate to the West, worried by possible severe consequences of her "defection" (as her joining Włodek would have been branded) for her family living in Soviet Armenia, therefore she returned with Aszot to Warsaw. There was a high degree of a drama in this decision. Back in Poland, Włodek, Bella and myself used to remind each other of one of the famous Radio Erevan jokes. The joke went like this. One of putative listeners of Radio Erevan asks: "Is it possible to built socialism in Switzerland? The Radio Erevan answers: "No, it is not possible. Switzerland is too small country for such a great disaster."

Not surprisingly, Włodek was almost devastated by this turn of events, but he was strongly convinced that his return to Warsaw would result in the virtual end of his scientific career. With some help from one of his Australian gurus, Sir John Eccles, who by that time worked in USA, Włodek got a teaching position at the State University of New York in Buffalo, where he was able to do some experimental work in the Neurosensory Laboratory of the University. His emigration to USA resulted in Bella divorcing Włodek, presumably to not to endanger her contacts with Armenia. In Buffalo Włodek met at a piano recital his new and last love, Polish musicologist, Eva Tumiel. Włodek and Eva married and moved to Pittsburgh, Pennsylvania where Włodek got Professorial position at the Carnegie-Mellon University while Eva, by now Eva Tumiel-Kozak, was and remains to this day Executive Art Manager and radio producer of Polish Music Series.

Włodek with his exceptional didactic gifts was a truly great teacher and was therefore immensely popular with all of the students whom he taught at the Carnegie-Mellon. In 1970s Włodek's research centered on the mechanisms underlying coding of information in the mammalian visual pathway (papers 24–27 on the Selected Bibliography list, see also papers 16 and 23 on the Selected Bibliography list). Although so far, the impact of this work was limited, many of the questions raised by this research remain to be answered and recently this line of research started to become more relevant. In his final years of research Włodek became interested in detecting early signs of deterioration of visual functions in diabetics and has developed a close collaboration with the distinguished Polish-American diabetologist, Professor T. S. Danowski from the University of Pittsburgh (positions 28–29 on the Selected Bibliography list).

Fortunately, Włodek unlike many others who decided to leave Poland in the late 1960s was able to retain his Polish citizenship. This combined with the acquired US citizenship allowed him to visit his beloved son Aszot in Armenia where he was living with his mother. Bella Harutiunian-Kozak returned to Armenia in 1974 and established a Laboratory of Visual Physiology at the Orbeli Institute of Physiology in Erevan. Aszot studied at the Department of Physics of the Erevan State University and after obtaining there his MSc degree emigrated to USA where he follows in his parents' footsteps, completing the PhD in neurophysiology at the Mt. Sinai Medical School of NYC.

The Laboratory of Visual System established by Włodek in the Nencki Institute has been a success surviving its creator. After Włodek had left, it was headed by Bella Harutiunian-Kozak until she returned to Armenia. Several PhD students who trained there have substantial scientific achievements; some of them became leaders of laboratories and departments in the Nencki Institute, preserving scientific ties with both Australia and Armenia. The Laboratory of Visual System is still a large and lively group, preoccupied with modern problems of investigating visual perception.

Włodek and Eva Tumiel-Kozak were happily married for 36 years and together made numerous trips not only to their native Poland but also 'sabbatical' trips to Włodek's beloved Australia. During his first return trip to Australia in 1979 Włodek spent several months working in Peter Bishop's laboratory in Canberra. He also gave a number of excellent lectures at several Australian Universities including Sydney University (where he was hosted by Professor Liam Burke, one of his close friends from early 1960s and by myself) and Monash University (where he was hosted by his old friend Professor Rod Westerman). During their visit in Australia Włodek and Eva stayed a few days with my wife Zofia and myself in our house in Sydney. To this day I remember vividly their recollections of witnessing the very first visit of John-Paul II in Poland. Although Włodek was not religious he was overwhelmed by the beauty and moral clarity of the Pope's homilies as well as the warmth and emotion of the crowds greeting the Pope.

Until 2008 when Włodek's health started to deteriorate seriously, Włodek and Eva led very active social and cultural (especially musical) lives. Their house in Pittsburgh was always open to scientific and non-scientific friends from many countries. His personality conquered also younger generations of the Nencki neuroscientists, who started their careers after he emigrated but were meeting him frequently at congresses and later in Poland. He had the habit of calling twice a year with Holiday greetings to an immense number of people all over the world, including those he met only a few times.

Indeed, Włodek Kozak combined vast intellectual gifts with great warmth not only towards his family but also towards his numerous friends spread all over the world. He is and will be truly remembered by all of us who had the great privilege of meeting and befriending him.

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Liam Burke, Elżbieta Jankowska, Bolek Srebro, Krzysztof Turlejski and Andrzej Wróbel (in alphabetical order) contributed to these recollections.

Portrait on page xix – Włodek Kozak at his 80th anniversary

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Note: By November 2011 Kozak's papers were cited over 1500 times altogether. One paper (position 9 on the Selected Bibliography list) has been cited over 400 times and is still cited. Two papers (positions 10 and 11) have been cited over 200 times, while three others (positions 5, 8, and 13) have been cited about 100 times each.