In memoriam of Yurii Rogozhin

November 13, 2019 would be the 70th birthday of Prof. Yurii Rogozhin.

Dr. hab. Yurii Rogozhin (November 13, 1949 † March 10, 2014) was a worldwide known computer scientist with diverse interests, ranged from finding small universal Turing machines to natural computing (e.g., DNA computing by splicing and insertion-deletion, membrane computing).

He was born in Berdicev, Ukraine. Yurii studied in Beltsy, then in 1967-1970 in the Mathematics Division of the Physics and Mathe-

matics Faculty, Chişinău State University, then since 1970 in Kuban State University, Krasnodar, and in 1975-1978 as a postgraduate in the Institute of Mathematics, Chişinău, where he continued a long research career. In 1981 Yurii defended his Ph.D thesis "Universal Turing Machines", Computer Center of the USSR Academy of Sciences in Moscow, scientific advisor Dr. Mark Bushko-Zhuk. In 1999 Yurii defended his habilitation thesis "On Formal Models of Computers and Calculations", Moscow State University.

Yurii had some outstanding results concerning universal Turing machines of small size. He proved that there are universal Turing machines of the types $UTM(24; 2)$; $UTM(10; 3)$; $UTM(7; 4)$; $UTM(5; 5)$; $UTM(4; 6)$; $UTM(3; 10)$, and $UTM(2; 18)$, where by $UTM(m; n)$ we denote the class of universal Turing machines with m states and n symbols. In 2002 Rogozhin and M. Kudlek presented a machine of type $UTM(3; 9)$, improving the previous result. These results and results of D. Woods and T. Neary reduce the number of classes $UTM(m; n)$ with an unsettled emptiness problem (i.e. if the class $UTM(m; n)$ is empty) to 41.

A time-varying distributed H system ($TVDH$ system) is a model of biomolecular computing which was introduced by Gh. Păun in 1996 and it has the following feature: at different moments one uses different sets of splicing rules (these sets are called components of $TVDH$ system) repeatedly. Gh.Păun showed that 7 components are enough in order to generate any recursively enumerable language. In 2004 Yurii and his partners Maurice Margenstern and Serghei Verlan showed that it is possible to construct a $TVDH$ system of degree one which models any $type-0$ formal grammar. Thus they completely answered the question of constructing $TVDH$ systems of smallest degree which generate any RE language using the parallel nature of molecular computations based on splicing operations.

In the area of membrane computing Yurii Rogozhin has (co)-authored over 50 publications. The first to be mentioned is a series of papers investigating minimal symport/antiport, in particular establishing the ultimate results for the computational completeness with two membranes, proved by very creative and highly nontrivial con-

structions. He also participated in research of transitional P systems, as well as of P systems with active membranes. Other topics of Yurii's systematic interest include using the framework of P systems as an additional control mechanism for such operations as insertion/deletion (including exo-operations) and splicing. In particular, he constructed the smallest known universal P system – with only five rules, the proof displaying how to perform multiple tasks by the same rule.

It was Yurii's idea to consider a hybrid computational model combining quantum subsystems and membrane subsystems. Other research directions with practical motivations in its scope are polymorphism, dictionary operations, generating inflections, parsing derivatives and annotating affixes of a natural language.

An issue[1] of Fundamenta Informaticae is dedicated to him. The total number of Yurii's publications exceeds 170[2], and a selected list can be found on the Institute's website[3]. The citation statistics[4] of Yurii's publications tracked by Google Scholar continues to grow, reflecting that his research is still very much appreciated. At the time of publication of this note it reports 1529 publications, resulting in h-index of 22 and i10-index of 48. The most cited publication is Small Universal Turing Machines[5], currently being freely accessible online and cited over 200 times.

Since the death of Yurii Rogozhin, Institute of Mathematics and Computer Science in Chişinău, Moldova, holds Workshop on Unconventional Computing Systems, a yearly event in a suitable date near Yurii's birthday.

The staff of the Vladimir Andrunachievici Institute of Mathematics and Computer Science

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[1] Fundamenta Informaticae **138**, 1–2, 2015

[2] Yurii Rogozhin's Biography and Publications. Fundamenta Informaticae **138**, 1–2, 273–284, 2015

[3] http://www.math.md/en/people/rogojin-iurie/

[4] https://scholar.google.com/citations?user=lZCufZEAAAAJ

[5] Yurii Rogozhin: Small Universal Turing Machines. Theoretical Computer Science **168**, 2, 215–240, 1996