In memory of Boris Trakhtenbrot, Mars Valiev and Michael Dekhtyar

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Boris (Boaz) Trakhtenbrot
(20.02.1921–19.09.2016)

Berta and Boris Trakhtenbrot
Jena, October 1997

Focus on *humanistic aspects*

Pure science only slightly

Moldova, WW2, Chernovtsy

Boris Abramovich Trakhtenbrot **was born** in **Brichevo village** in Northern Bessarabia (now **Moldova**).

1940 the **Moldavian Pedagogical Institute** in **Kishinev**

Then **WW2**, evacuation. . . , returning back. . .

1945 the **University of Chernovtsy** (**Ukraine**)

1947 **Master's degree**

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Moldova, WW2, Chernovtsy

Also a happy time - *married*

Berta Isaakovna Rabinovich (1921–2013)

Warm hospitality of this family,

particularly of truly remarkable woman Berta

Isaakovna

Two sons Mark and Josef

and, now, many grandchildren

Kiev-Moscow 1947–50, **PhD degree**

1947–50 **Ph.D. studies** at the **Kiev Mathematical Institute** of the Ukrainian Academy of Sciences

Under direction of **P. S. Novikov** from **Moscow**.

A **brilliant scientific start** with

famous **Trakhtenbrot's Theorem:**

Finite version of Church's Theorem about non-recursive enumerability of first order logic truths on finite models.

Difficult time for survival of **mathematical logic** in the USSR

Absurd semi-official ideological accusations against father-founders

B. Russel ("warmonger" – поджигатель войны)
A. Tarski ("militant bourgeois" – воинствующий буржуа).

Actually, against Soviet logicians

Trakhtenbrot was ***only a passive witness*** of such attacks at that time...

Penza 1950–1960, the Pedagogical Institute

After a **seminar talk**

  "The method of symbolic calculi in mathematics",

Trakhtenbrot was

blamed of being "an idealist of Carnap-species"

Quite a **dangerous** accusation in **early 50-th**.

Moscow's colleagues **P. S. Novikov, A. A. Lyapunov, A.N. Kolmogorov** and others ***were able to defend him***.

Trakhtenbrot always ***priced highly*** **A. A. Lyapunov** (1911–1973) for his influence on him and support.

Even good consequences of this dangerous story

Trakhtenbrot's **_humorous_** view from more quiet 1970s:

"algorithmically undecidable problems" = **_"ideological crime"_**

"Nothing undecidable for the great Soviet people!"

He published an _article_ in a "Mathematics in School" journal in 1956:

"Algorithms and automatic problem solving"

Later it was reworked (1957, 1960, 1974)

as a widely popular introductory **textbook** in the USSR and even abroad

"Algorithms and Computational Automata".

Siberian Period 1960–1980
Akademgorodok

Institute of Mathematics of the USSR Academy of Sciences' **Siberian Branch** (IM SB AS USSR) - *research*

Initially in the **Department of Theoretical Cybernetics** (through the initiative and guidance of **A. A. Lyapunov**)

Also **Novosibirsk State University** in - *lecturing*

In 1967 **B. Trakhtenbrot** and **A. Gladky** jointly established the

Department of Automata Theory and Mathematical Linguistics.

in the **Institute of Mathematics**

Department of Automata Theory and Mathematical Linguistics

Collectively, in Academgorodok, *in various periods*

staff, undergraduate and PhD students

related with the **Department** were:

V. Agafonov, J. Barzdins, N. Belyakin, V. Boyarkin, **M.Dekhtyar**, A. Dikovsky R. Freivalds, A. Korshunov, J.Hodjaev, M. Kratko, Z. Litvintseva, I. Lomazova, Matveeva, L. Modina, V. Nepomniaschy, L. Orekhovskaya, V. Sazonov, M. Sokolovskiy, A. Vaiser, **M. Valiev**.

Photo 1975-1977. V. Boyarkin, A. Dikovsky, B. Trakhtenbrot, L.Modina, M. Valiev, V. Agafonov, V. Sazonov, M. Dekhtyar

The departmental **seminar**
"Algorithms and Automata"

Seminar was visited by many **guests**:

former staff, etc. and

S. Artemov, M. Kanovich, E .Kinber, V. Kotov, L. Levin, L. Lisovik, A.Nepomniaschy, G. Plesnevich, R. Pliŭskevičius, A. Slisenko, M.Taitslin, M. Trakhtenbrot, G. Tseitlin,…

Siberian Period 1960–1980

Highly fruitful period for B. Trakhtenbrot working on

- *automata theory* (publishing **two books** in co-authorship of one with N. Kobrinsky (1910–1985) and another with J.Barzdins)

- *complexity theory, semantical and logical problems of high level programming languages*, etc.

- published **Lecture Notes**

 "The Complexity of Algorithms and Computations" (1967)

- See much more on research of B.Trakhtenbrot in [2,3].

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Unfortunately, Siberian Period *finished* in 1980

because Trakhtenbrot **emigrated** to Israel.

Highly unpleasant quasi-scientific politics preceded.

Trakhtenbrot and some colleagues, e.g. Leonid Levin and Michael Dekhtyar, were **suffering**.

In particular, **in 1977** Trakhtenbrot was

- **deprived of the management** of his Department (of Automata Theory…) and

- **excluded** from the **Scientific Council** of Institute of Mathematics.

- Trakhtenbrot's **participation** in the new edition of the Soviet **Mathematical Encyclopedia** was **stopped**

Unfortunately, Siberian Period *finished* in 1980

It is **awful when the situation**, actually starting seemingly from quite harmless, even reasonable **scientific discussions** on formalizations of new intuitions

developed to **confrontation on various levels** with

so highly unpleasant consequences and far going effects on Trakhtenbrot and some of his colleagues.

Trakhtenbrot himself described this in detail (even mathematical!) in [6,7].

Consequences after Trakhtenbrot's emigration to Israel in 1980

M. Dektyar, M. Valiev and, later, I. Lomazova, me and V. Agafonov eventually ***moved to the European part of USSR***.

Others, already working in different places, stayed in Novosibirsk.

Mark Trakhtenbrot also emigrated to Israel.

The entire life for those who moved has changed.

Dikovsky and Modina had already relocated to Kalinin (nowadays, Tver) in 1978.

Anyway, we were

- ***always connected*** to each other and
- some of us ***cooperated scientifically*** in various ways, e.g.
- participating in ***joint projects***.

Israel, 1981, Professor of Computer Science at Tel Aviv University

at that political time

we could never meet again...

A very strange and *really painful game of fate*

However, the *history of the Soviet Union* had been *changing so dramatically and rapidly* ...

Trakhtenbrot *came back* to the USSR for the symposium *"Logic at Botik"*, Pereslavl-Zalessky, 1989

This was *like a miracle!* We *could not even dream of it!*

V. Sazonov, J. Barzdins, R. Freivald, A. Dikovsky, B. Trakhtenbrot, M. Valiev, M. Kratko, V. Nepomniaschy

Tver, the river Volga, after the *"Logical Foundations of Computer Science"* symposium, held near Tver (Seliger) in July 1992
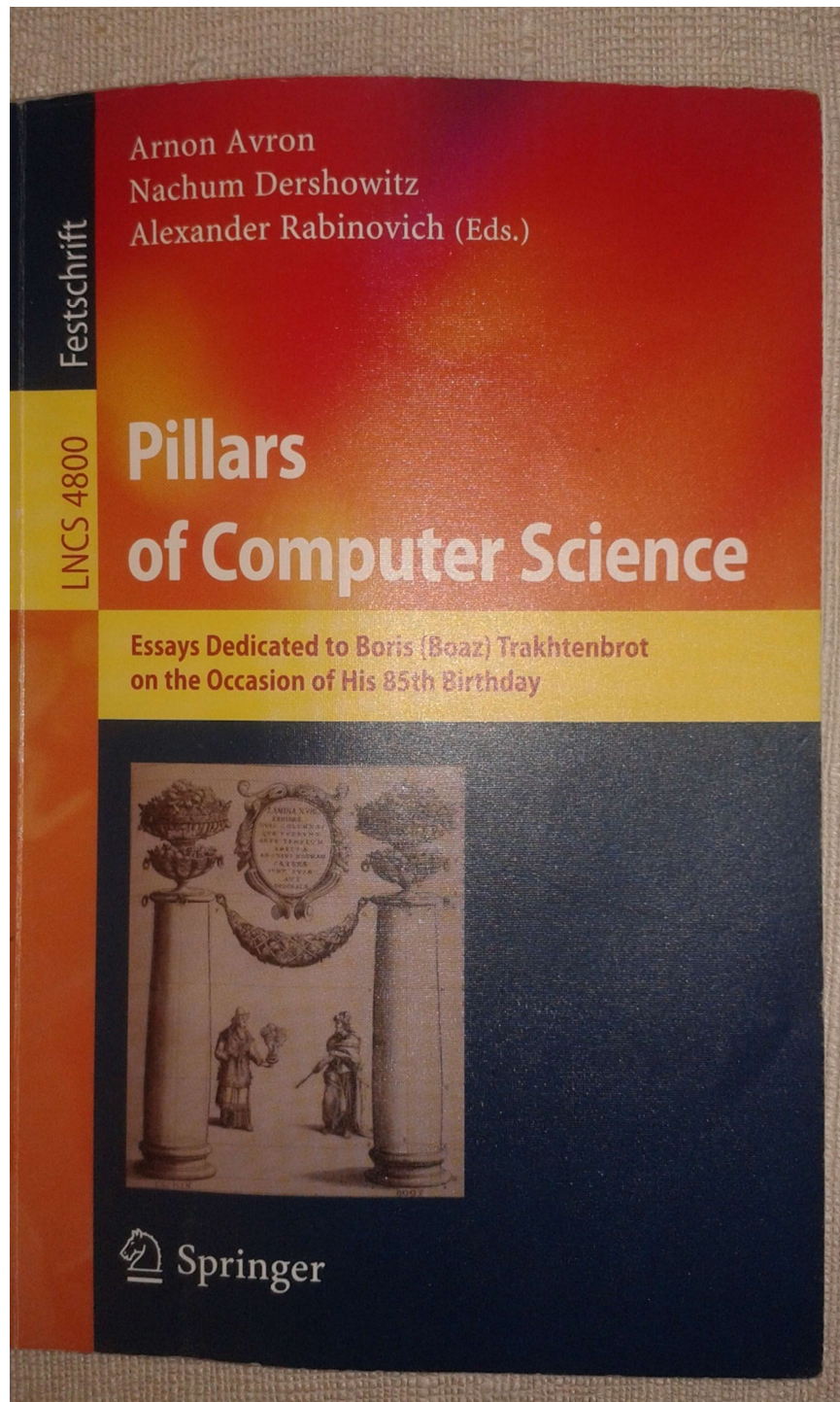
M. Sokolovskiy, M. Dekhtyar, M. Valiev, B. Trakhtenbrot, V. Sazonov, I. Lomazova, V.Agafonov

Spring? 1996, Tel Aviv

Scientific achievements of Boris Trakhtenbrot

His world-wide role as a

 'Pillar of Computer Science'

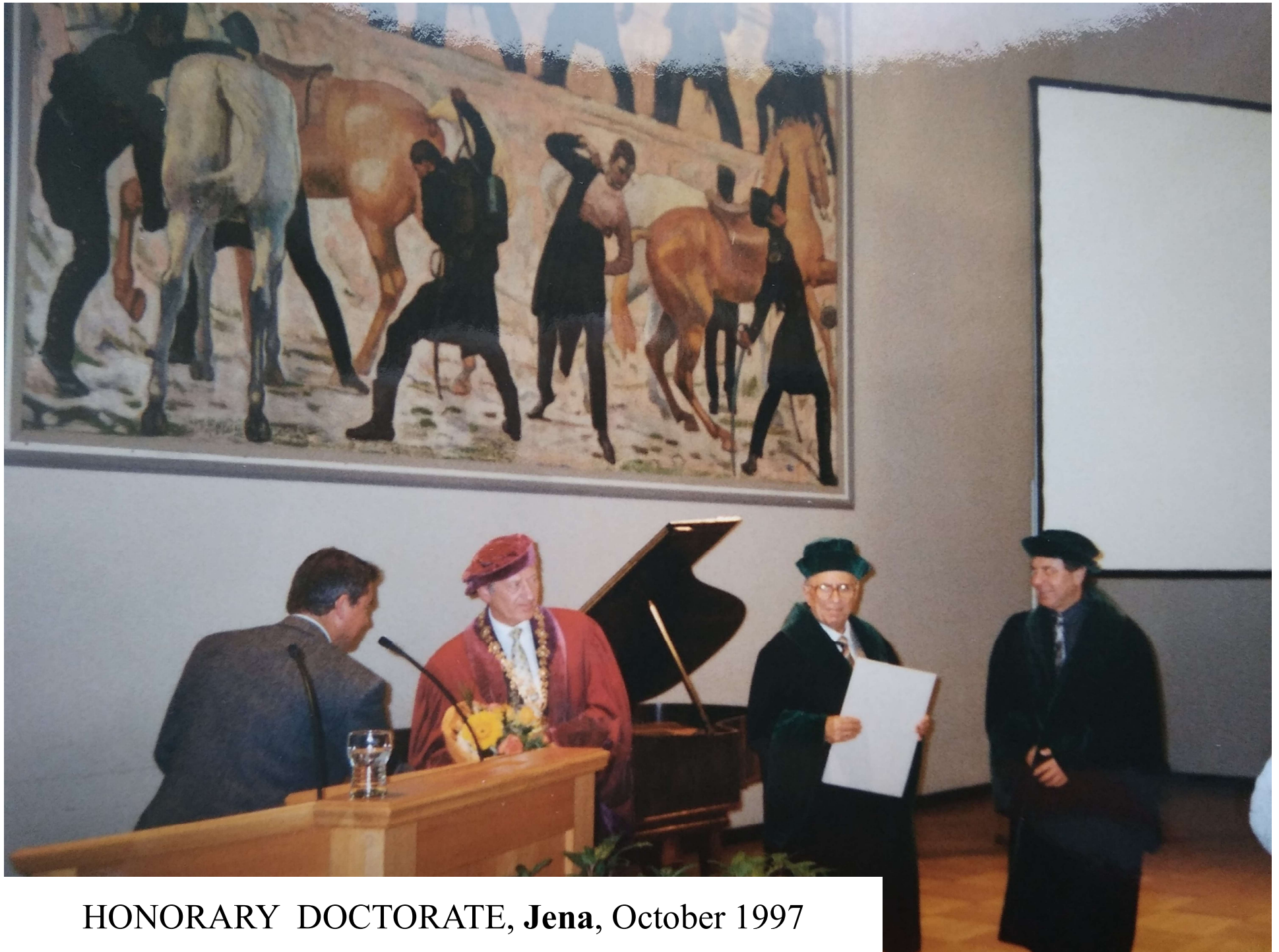See in [1,4].

Scientific achievements of Boris Trakhtenbrot

The Friedrich Schiller University in **Jena** bestowed a degree of

doctor honoris causa

on Trakhtenbrot

HONORARY DOCTORATE, Jena, October 1997

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HONORARY DOCTORATE, **Jena**, October 1997

Jena, October 1997; V.Sazonov, M.Valiev, Berta I.Trakhtenbrot, A.Dikovsky

HONORARY DOCTORATE, **Jena**, October 1997

HONORARY DOCTORATE, **Jena**, October 1997

Jena, October 1997; M. Valiev, Boris A. and Berta I.Trakhtenbrot, A. Dikovsky

Jena, October 1997; A.Dikovsky, Berta I. and Boris A.Trakhtenbrot, V.Sazonov

Jena, October 1997; M.Valiev, A.Dikovsky, Boris A. and Berta I. Trakhtenbrot

EATCS annual Distinguished Achievements Award of 2011

Trakhtenbrot was also honoured with this **highly prestigious Award**

"to acknowledge extensive and widely recognized contributions to theoretical computer science over a life long scientific career"

Boris Trakhtenbrot
(20.02.1921–19.09.2016)

It looks a happy life in spite of all problems

Created his own School –

the Trakhtenbrot's School

with a great scientific and moral atmosphere

Boris Trakhtenbrot passed away at the age of 95

– great loss for us and Computer Science

Mars Kotdusovich Valiev
(01.01.1942–31.01.2018)

Mars **was born** in Adaevo village, **Tatarstan**, Russia,

Graduated in the village Poisevo with a silver medal.

5th January 2017
Age 75

Valiev in Novosibirsk, Academgorodok

At 16 - a student of mathematics at **Kazan State University**

Was seconded to practice at the **Novosibirsk State University**

Became a *PhD student* under direction of Trakhtenbrot

Got a junior research position in the **Institute of Mathematics SB AS USSR**

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M.Valiev in Novosibirsk, Academgorodok

PhD **Thesis:** *"On Complexity of Word Problem for Finitely Presented Groups"* (1969)

Gradually, since about 1978 his **interests were extended widely and radically** as:

- *application of mathematical logic to programming and database theory,*
- *computational complexity,*
- *multi-agent systems and*
- *distributed computing.*

From 90-th - in a close and fruitful *cooperation* with M.Dekhtyar and A. Dikovsky.

A. Dikovsky and M. Valiev

On generalized logic
of branching time

M. K. Valiev
(Keldysh Institute
for Applied Mathematics,
Moscow, Russia)

M. Valiev

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Mars Valiev **in Moscow**

After emigration of Trakhtenbrot, Mars moved to **Moscow** where he worked in various places:

1982 - Moscow Institute of Electronic Engineering (электронного машиностроения)

1984 - Institute of System Analysis of RAS (formerly **ВНИИСИ**).

Scientifically most important were

1994 - M.V. Keldysh's Institute of Applied Mathematics of RAS (Senior Researcher at *Department of Information Modelling and Control Systems*)

2005 - Russian State University for the Humanities (known as **РГГУ** or **RGGU**; Associate Professor, reading the courses of lectures on "Programming", "Mathematical Linguistics" and "Mathematical Logic")

Lipari Workshop 1997, **INTAS Project**; V.Sazonov, A.Ferro, A.Lisitsa, M.Valiev

Lipari 1997; To Stromboli Island and Volcano

Mars, 5th January 2017, Age 75

Mars, 5th January 2017, Age 75

Mars Kotdusovich Valiev
(01.01.1942–31.01.2018)

Highly **talented** and **fruitful** scientist

At least **68 publications**. See also his 'Research Gate' [10].

Very responsive and friendly

Always ready to help his young colleagues

Actually was a heart and soul of the team

Always remembered about everybody living here-and-there

Usually it was Mars who informed us about everything important what happened to anyone in the team.

Mars died of a heart attack at the age of 76 - so painful loss.

Michael Iosifovich Dekhtyar
(18.11.1946–17.03.2018)

Born in Zhitomir (Ukraine)

Finished there high school with the golden medal.

The winner of the Ukrainian Republican Mathematical Olympiad.

Quite independently, both he and his future wife Rika simultaneously enrolled to the **Novosibirsk State University** in **1964**.

Novosibirsk State University
Academgorodok

Besides studying, they worked in the line of the Komsomol on *organizing mathematical "circles" (math clubs) in schools* of Academgorodok.

This way. . . they fell in love and **married in 1969** in the last year of their studies.

A **very happy family** with son Alexander (and now with two grandsons).

Quite early - a **permanent participant of the Trakhtenbrot's seminar** at the Institute of Mathematics.

Novosibirsk State University
-> **Institute of Mathematics**

During this period **first research work** on **'perebor'.**

At that time the very concept had only a very intuitive level, and required some first mathematical approaches.

It was proved by M. I. Dekhtyar **in his Master's Thesis (1969)** *essentially* the **relativised version** of the **P≠NP** conjecture.

Anticipating one of the results by **Backer**, **Gill** and **Soloway (1975)**

1971-1981: PhD Student and then **Junior Researcer** at the **Institute of Mathematics**

This work on **'perebor'** eventually resulted in his **PhD Thesis**: *"On the Complexity of Relativised Computations"*, Moscow State University (1977).

Novosibirsk State University -> **Institute of Mathematics**

However, before enrolling to postgraduate study at the Institute of Mathematics SB USSR Academy of Sci, Michael had to serve two years

1969–1971 in the **Soviet Army** as a lieutenant in the city of Semipalatinsk.

Tver

After Trakhtenbrot's emigration the Dekhtyars moved in Tver

where Michael was eager to reunite and work with Dikovsky

Was impossible right away

Michael began to work officially on *software projects* (against his mathematical interests) in:

(1982–1987) Tver **Special Design Office of Control Systems** (Chief Designer), then

(1987–1991) Tver NPO the **Centre of Program Systems** (Leading Researcher).

Tver

At last, the **official activity** of Michael **became coinciding with his research interests:**

(1991–2015) *The* **Department of Informatics** *of* **Tver State University** (Associate Professor and then Professor since 2010).

Michael received **Doctor of Science Degree** in mathematics in 2009 with the dissertation *"Semantics and the complexity analysis of algorithmic problems of dynamic systems and languages using logic programming".*

Tver

Overall, Michael was one of the ***outstanding computer scientists in Russia*** with wide range of research interests:

- Complexity of Computations and Algorithms

- Kolmogorov's Complexity

- Data Bases (active, deductive, probabilistic and temporal)

- Artificial Intelligence, Logic Programming

- Intellectual Program Agents and Multiagent Systems

- Bioinformatics, Computational Linguistics

He has at least **109 publications** incl. **7 tutorial books**.

His **two successful PhD students** are S. Dudakov (2000) and B. Karlov (2012).

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Tver -> USA

Being an **exceptional mathematician** Michael could **explain complicated concepts very clearly** even to non-specialists.

He was a *charismatic* person who *radiated kindness, generosity and calm confidence*.

In 2017 Michael and Rika **moved to USA** to join the family of their **son**

Alexander Dekhtyar, Professor at the Dept. of Computer Science at California Polytechnic State University.

So, he has followed his father's scientific footsteps.

Michael died after a long illness at the age of 71.

Recalling **meetings**
with Mars and Michael in Tver.

Regular meetings of old friends and colleagues where usually held in the **_hospitable house_** of Michael and Rika Dekhtyar in Tver.

These were long and interesting **_discussions on various topics_** connected not only to research news.

Once in 2013 Mars, Michael and I were watching a dramatic **_TV discussion_** featuring a

reform of Russian Academy of Sciences

An extreme anxiety and emotions overpowered us.

Then Alexandr Dikovsky from Nantes in France (who was already critically ill) joined us by the Skype and our hot and intense conversation continued. . .

Michael's 50th Jubilee, 1996 Tver

5 Jan 2016

Last meetings were especially touching and emotional

Meeting before Dekhtyars moving to USA

6 Jan 2016. L.Sazonova, M.Dekhtyar, I.Lomazova, M.Valiev, Rika Dekhtyar, V.Sazonov

6 Jan 2016. M.Dekhtyar, I.Lomazova, M.Valiev, V.Sazonov

Last words

Boris Trakhtenbrot, **Mars Valiev** and **Michael Dekhtyar** are greatly missed.

No doubts, all of us who knew them, are devastated and heartbroken by the loss of our friends and colleagues.

Now, we have no opportunity to find ourselves in their circle again,

"to warm up by the fire of their hearts",

to restore those wonderful feelings when we began our scientific life and friendship together in *that amazing atmosphere of our spiritual unity*.

Last words

They will remain *in our hearts and memories forever*, *together with other colleagues and friends who also left us:*

V. A. Agafonov (1940–1997),
B. I. Trakhtenbrot (1921–2013),
M. A. Taitslin (1936–2013),
A. Ja. Dikovsky (1945–2014),
N. V. Belyakin (1936–2016),
R. V. Freivalds, (1942–2016),
L. S. Modina (1945–2017),

and just **in the most recent months**

M. I. Kratko (1936–2018) and A. V. Gladky (1928–2018).

Acknowledgments

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Mark Trakhtenbrot, Venera Erikova and ***Rika Dekhtyar***

for providing their memories and commenting on the text.

References

1. Avron, A., Dershowitz, N., Rabinovich. A. (Eds.): Pillars of Computer Science: Essays Dedicated to Boris (Boaz) Trakhtenbrot on the Occasion of His 85th Birthday, Lect. Notes in Comp. Sci. vol. 4800, Springer Berlin, Heidelberg (2008)

2. Trakhtenbrot, B. A.: From Logic to Theoretical Computer ScienceAn Update. In [1], pp. 1–38.

3. Avron, A., Dershowitz, N., Rabinovich. A. (Eds.): Boris A. Trakhtenbrot: Academic
Genealogy and Publications. In [1], pp. 46–57.

4. ACM NEWS In Memoriam: Boris Trakhtenbrot, 1921-2016 https://cacm.acm.org/news/207650-in-memoriam-boris-trakhtenbrot-1921-2016/fulltext

5. EATCS annual Distinguished Achievements Award of 2011; http://eatcs.org/index.php/eatcs-award

6. Trakhtenbrot, B. A.: A Survey of Russian Approaches to Perebor. Annals of the History of Computing. 6(4), 384–400 (1984)

7. Trakhtenbrot, B. A.: In memory of Andrei P. Ershov. In: Ershov, a Scientist and Human Being (In Russian), Novosibirsk, Nauka, (2006) pp. 343–352

8. Dekhtyar, M. I.: http://homepages.tversu.ru/~p000103/

9. Dekhtyar, M. I.: https://www.researchgate.net/profile/Michael_Dekht

10. Valiev, M. K.: https://www.researchgate.net/profile/Mars_Valiev