

Alexandr Levich (1945–2016) and the Tartu–Moscow Biosemiotic Nexus

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On 28 March this year Alexandr Levich (1945–2016), the former leader of the theoretical biology group and of the interdisciplinary temporology seminar at Moscow State University, passed away. Looking back now, we can see more clearly the remarkable effect that the joint events and friendship that had connected us since the 1970s had on the development of biosemiotics.



Figure 1. Alexander Levich in Viitna, January 1978, speaking at the closing event of the winter school on theoretical biology. Photo by Toomas Tiivel.

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Alexandr Petrovich Levich was a Russian scholar of Jewish descent, a theoretical biologist. After his studies in the field of theoretical and mathematical physics at the Moscow Institute of Engineering and Physics (*Московский инженерно-физический институт – МИФИ*) he worked as a researcher in the Departments of Hydrobiology (later renamed as General Ecology) and Biophysics at Moscow State University. In the autumn of 1974, he established Group β (*группа бета*)² that conducted seminar series and winter schools on theoretical biology. Each member of the group worked on a particular research question. By and by, this led to the formation of subgroups³, supervised by scholars proposed by Levich. The subgroup of Languages of Biological Systems was supervised by Vasili Nalimov.

In 1984, Levich founded the Interdisciplinary Temporology Seminar and remained its leader for 30 years. The seminar met regularly every fortnight during term time.⁴

Levich's interests included mathematical biology, particularly the application of the theory of categories in biology, mathematical description of ecosystem structure and ecological diversity, methods of analysis of hydrobiological communities, and the study of the phenomenon of time, temporology. In addition to about 200 articles, his publications include several monographs (Levich 1980, 1982, 2012; Levich *et al.* 1997, 2004) and edited volumes (Levich 1995, 1996a, 1996b, 2009).

The explicitly semiotic work of Levich was related to his concept of ecological code that he introduced in 1977. Although the semiotic aspect did not become central among his interests, his influence on the semiotic movement in biology via the organization of winter schools in theoretical biology (with a “semiotic” atmosphere), and via his pupils (in particular, Alexei Sharov) has been remarkable.

In the early 1970s, groups of theoretical biology were established completely independently, without knowing about each other, both in Tartu and in Moscow. In January–February 1975, Levich and his students organized a Winter School in theoretical biology in Kirillo-Belozersk (Vologda oblast with a ski trip to Ferapontovo). In May of the same year we organized our first Estonian Spring School in theoretical biology in Rutja village in North Estonia.

In the autumn of 1975, as a result of my visit to Moscow to find colleagues in theoretical biology, we got in touch and, as a result, the Estonian group participated in the Second Winter School in Borok (in Yaroslavl oblast, at the Institute for Biology of Inland Waters) from 28 January to 5 February, 1976, with a delegation of six young

² The full name of the group was '*рабочая группа конструктивных разработок в теоретической биологии*'.

³ Levich and Mikhailovsky (1979a: 10) list seven subgroups.

⁴ See an interview with Levich on the occasion of 25 years of the temporology seminar – Salikhova, Levich 2009.

scholars⁵. At the Borok Winter School, the leading figures of Russian structuralist biology of the time (including followers of Aleksandr Lyubishchev) participated, which meant discussions on most fascinating problems of biology. This created much of enthusiasm for many years to follow.

The Third Winter School took place in Kondopoga (Kontupohja, Karelia) in 1977, the Fourth in Viitna (Estonia) in January 1978, and the Fifth in Priozersk (Leningrad oblast) on 27–30 January, 1979⁶. In all these, an Estonian delegation participated. The last winter school, the sixth in the series, was organized in January–February 1980 in Dmitrov (Moscow oblast). Immediately after that, the theoretical biology group was closed down by the order of the dean of Moscow University⁷ (Fig. 2). Nevertheless, Levich was able to organize a school on ecological prognosis in Chernogolovka (Moscow oblast) in December 1981, with some biotheoretical sections (Readings in theoretical biology, Methodological aspects of ecological prognosis, Theoretical principles of biology and ecological prognosis).

In parallel, we organized the annual Estonian Spring Schools in every May – a series of meetings that is continued up to now with the 42nd Spring School taking place in 2016⁸. In their early years, the Spring Schools certainly received additional energy from the connections with the Moscow and St. Petersburg groups.

The 4th Winter School in theoretical biology that took place on January 26–31, 1978, in Viitna (Estonia), and was followed by the conference “Biology and Linguistics” in Tartu on February 1–3, was of particular importance for semiotics. In the organization of this conference, also the Leningrad theoretical biology seminar (led by Sergej Chebanov) participated besides the Tartu and Moscow groups. The conference was attended by the leading non-Darwinian structuralist biologists of the Soviet Union and by several leaders of the Tartu–Moscow School of Semiotics. Thus, it was an occasion for biosemioticians and semioticians of culture to meet.⁹

⁵ The delegation included Mati Kahru, Raivo Leht, Toomas Neuman, Tiit Paaver, Toomas Tiivel, and myself.

⁶ See Sapunov 1979a.

⁷ Behind this was probably an order from the KGB. There had been serious warnings and conflicts with officials already in 1978 in connection with the Tartu conference (as “insufficiently authorized”). As a result, we had to register our Tartu theoretical biology group officially at the Students’ Scientific Society of the University in March 1978. (The Section of Theoretical Biology of the Estonian Naturalists’ Society was established in November 1977.)

⁸ The attendance of our schools by Russian colleagues was limited because the working language of most of our events has been Estonian. See the overview in Laanisto *et al.* 2014.

⁹ More about this in Kull 1978; 1999: 122; Levich, Mikhailovsky 1979b.

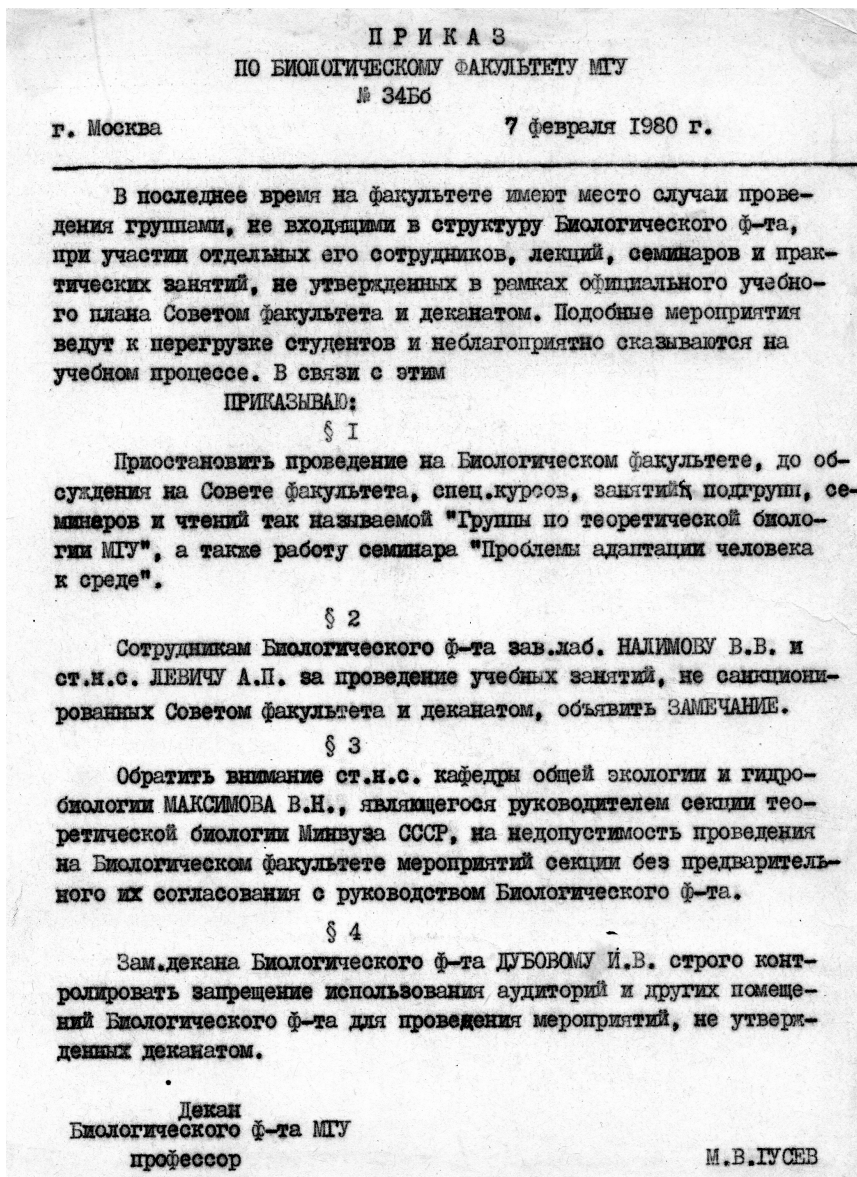


Figure 2. The document that ordered the closure of the theoretical biology group led by Levich. It reads: "Order of the Biological Faculty of Moscow State University no. 34Bb from February 7, 1980. [...] I order: §1 To stop special courses, activities of subgroups, seminars and readings of the so-called "group of theoretical biology of MSU" [...]. §2 To issue a warning to V. V. Nalimov and A. P. Levich for teaching classes unauthorized by the committee of the Faculty and Dean's office. [...] Dean of the Biological Faculty of MSU [...]" (From the archive of Group β. Courtesy of E. Gorokhovskaja.)

While semiotics of culture was already a well-established discipline in the 1970s, biosemiotics was only making its first steps. However, the term ‘biosemiotics’ was explicitly used already in 1978 – one of the sessions of the “Biology and Linguistics” meeting in Tartu was titled as “Biosemiotic research abroad”.¹⁰

Thus, connections between the theoretical biology groups of Tartu and Moscow were strong in the years 1976–1980. It resulted in a long-term friendship between several participants, which influenced their further scholarly work. For instance, this meant an interest in the works of Lev Berg (1876–1950) and Alexander Lyubischev (1890–1972), and the research on non-Darwinian biology.

I suppose that an additional factor in connecting biology with semiotics and thus in the movement towards biosemiotics must have been the friendship between the semiotician and cybernetician Julius Schreider (1927–1998) and the structural biologist and paleobotanist Sergei Meyen (1935–1987) – both working with the legacy of Lyubischev, who strongly influenced Group β and whose work we followed in Tartu.¹¹ Both Schreider and Meyen visited Tartu a couple of times (Schreider also was a close acquaintance of the art historian Boris Bernstein and thus visited Tallinn several times).

It can be said that what was formed was a Tartu–Moscow Nexus¹² in theoretical biology that had some similar and analogical features to the Tartu–Moscow connection in semiotics. There certainly was a similarity between our winter schools and the semioticians’ summer schools in Kääriku, Estonia: for both the theoretical biologists and semioticians, the central events were (summer, spring, or winter) schools taking place in the countryside. What was also similar was the ideological inclination and enthusiasm. At the joint event “Biology and Linguistics” semioticians and theoretical biologists even met one another. For both schools, the dominant methodology used was structuralism (at least initially), in humanities and in ecology and theoretical biology, respectively.¹³ Both could be characterized as non-mainstream movements, as “dissident” sciences of the time.¹⁴ Both had their St. Petersburg (then Leningrad) component – in the case of theoretical biology it was Sergej Chebanov’s seminar with its emphasis on biohermeneutics.¹⁵

¹⁰ See also Kull, Salupere, Torop, Lotman 2011: 324.

¹¹ Juri Lotman published an article by Lyubischev (1977) – together with an accompanying text by Schreider (1977) in *Sign Systems Studies* (vol. 9). Some of Meyen’s work was translated and published in Estonian, including his article on ethics in science “Принцип сочувствия” (Meien 1987). Note also Schreider, Sharov 1982; Sharov, Igamberdiev 2014.

¹² In choosing the word ‘nexus’ in the title of the current essay I am following Favareau (2010: 53) who used this word when writing about “Copenhagen–Tartu nexus”.

¹³ About the biological roots of structuralism, see, e.g., Sériot 2014; on structuralist biology in relation to the Russian nomogenetic approach, see also Brauckmann, Kull 1997.

¹⁴ Cf. Kull, Lotman 2012.

¹⁵ For a detailed account of the St. Petersburg seminar, see Chebanov 1998; Sapunov 1979b.

After the winter schools, some smaller-scale events followed. One of these, the workshop “Semiotic approach in theoretical biology”, took place at the Laelatu Biological Station on 28–30 October, 1988.¹⁶ Also, as collaborative publications of the Tartu and Moscow scholars, two volumes of *Lectures in Theoretical Biology* (1988; 1993, ed. by Kull and Tiivel) should be mentioned, which also included articles by Levich (Levich 1988; 1993).¹⁷

Later, our interests somewhat diverged. Levich became deeply involved in research of the phenomenon of time,¹⁸ organizing the seminar on this topic throughout three decades, and worked on projects that dealt with water ecosystems.¹⁹ However, one of most active members of the theoretical biology group, Alexei Sharov, who was trained as an entomologist and worked in population biology, continued working in biosemiotics and organized a series of seminars and two winter schools in Sushnevo (Vladimirskaya oblast) in this field in 1987–1990, before his emigration to the United States in 1990 (Sharov 1990).²⁰

The explicitly biosemiotic work of Levich remained limited to his concept of the ecological code. The concept of the code was very popular in the structuralism (as well as the cybernetics, communication studies, and genetics) of the 1970s – e.g. cultural codes, the genetic code, etc. The concept of the ecological code was introduced by Levich in 1977 (Levich 1977; Levich, Lovyagin 1977), and he used it repeatedly in his works for some years after this (for instance, Levich 1978: 117, 1980:

¹⁶ The participants included Aleksander Levich, Alexei Sharov, George E. Mikhailovsky and Jevgeni V. Presnov from Moscow, Sergej Chebanov from St. Petersburg, Dobilas Kirvelis from Vilnius, Olevi Kull, Toomas Tiivel, Raivo Leht, Kalevi Kull *et al.* from Estonia.

¹⁷ Let me also mention the role of the Estonian conditions (recalled also by the members of Tartu–Moscow Semiotic School): for instance, Georgy Mikhailovsky writes in a recent letter (May 12, 2016) to me of “the unforgettable atmosphere of our Estonian meetings, when we, the Russian guests, drank with greedy gulps the freedom that was unusual for us then” (*вспомнив “незабываемую атмосферу наших эстонских встреч, когда мы, российские гости, жадными глотками пили непривычную для нас тогда свободу”*).

¹⁸ See, e.g., Levich 1993 on the origin of the problem of time in theoretical biology, as Levich saw it. He suggested that only via understanding time, life can be understood and thought that modelling of time is important for understanding dynamics in any system.

¹⁹ Afterwards our contacts became less frequent. An exception was my visit to Moscow on the occasion of the 35th anniversary of Group β, where I presented a lecture titled “*Семиотический поворот в биологии и биологический поворот в семиотике, или предвременная семиотика*” (“The semiotic turn in biology and the biological turn in semiotics, or pretemporal semiotics”) on 7 April, 2009.

²⁰ Since the 1990s, some events on biosemiotics have taken place in St. Petersburg, such as the conference “A new phase of development of general semiotics: The contribution of techno- and biosemiotics” (“*Новый этап становления общей семиотики: вклад техно- и биосемиотики*”) on 17–19 April, 2003 (which I attended).

7, 11; Levich, Mikhailovsky 1979a) and published a longer article on this concept in 1983 (Levich 1983)²¹.

Levich defined the ecological code as a mapping of supraorganismic informational connections in a community:

The existence of informational structure and, in a more general sense, “languages” in the biosystems of all levels of organization makes it possible to speak about the existence of ecological code, with the help of which the organization of structures and the regulation is carried out in supraorganismic systems. (Levich 1977: 67)

Наличие информационной структуры сообществ и в более общем значении – «языков» у биосистем на всех уровнях организации живого позволяет говорить о существовании экологического кода, с помощью которого осуществляются организация структур и регулирование в надорганизменных системах.

He makes a distinction between trophic structure, spatial structure, age structure, limitational structure, and informational structure. The latter is based on code-relations (Levich 1977: 64).

In his works after 1983, Levich mainly uses the term ‘informational structure of community’ instead of ‘ecological code’, and does not use semiotic terminology. However, he is continuously working on finding the proper mathematical tools for describing the code-type (informational) structures of living systems. In particular, he finds category theory and determination analysis (e.g., Maximov *et al.* 2000) to be useful methods for this task.

Let me also provide some quotes from Levich’ work that demonstrate a very early acceptance of the basic biosemiotic approach, which seems to have been independent from Thomas Sebeok and several other early biosemioticians.²²

For instance, an article about the relationships between biology and linguistics and about the subgroup of “Languages of biological systems” in the theoretical biology seminar maintains:

Language [...] is almost a synonym of the living. Every living system has a language. And in any system which we consider non-living, there is no language. [...] The point is that the communities themselves are in a certain sense languages, or, better to say, texts, made of “words” – of individuals. (Levich, Mikhailovsky 1979a: 13)

²¹ See also Kull 2010, 2016a, 2016b.

²² It may be that Levich did this under the influence of reading C. H. Waddington’s symposia papers on theoretical biology (the first volume was published also in Russian – Waddington 1970), in particular the work of Howard Pattee (as supposed by Sergej Chebanov in our conversation in Tartu on 3 May, 2016).

Язык – [...] почти синоним живого. Любая биологическая система обладает языком. И ни в одной из систем, которые мы признаем неживыми, языка нет. [...] Дело в том, что сами сообщества суть в некотором смысле языки или, лучше сказать, тексты, составленные из «слов» – особей.

Levich (1983: 68) also writes:

It is possible that the boundary between the living and the non-living in nature is situated between the reflection of reality by signs and the direct reflection [...].

A particular communicational sign system may have a different amount of “linguageness” on the axis of “language – code” (Nalimov 1974): language, the meaning field of each word-sign of which is becoming a single one, is degenerating into a code. [...]

If the study of linguistic structures in cellular, organismic, and population levels (genetic code, hormonal and neural regulation, analogues of speech) are already traditional areas in experimental and theoretical biology, then the acknowledging of the informational structure of supraorganismic communities is a feature of contemporary biology.

Вполне возможно, что грань живого и неживого в природе находится между знаковым и непосредственным отражением реальности. [...]

Конкретная коммуникационная знаковая система может иметь различную степень “языковости” на оси “язык – код” (Налимов, 1974): в код вырождается язык, для которого поле смыслов для каждого слова-знака сводится к единственному значению. [...]

Если изучение языковых структур на клеточном, организменном и популяционном уровнях (генокод, гормональная и нервная регуляция, аналоги речи) – традиционные области экспериментальной и теоретической биологии, то осознание существования информационной структуры сообществ надорганизменного уровня – черта современной биологии.

Together with the theoretical biologist George Mikhailovsky, Levich wrote a review of the 1978 Winter School in Estonia. In a paragraph about the meeting “Biology and Linguistics” in Tartu, they write:

Language can be considered as a characteristic feature of the living: every living system has a language,²³ i.e. the specific means of communication. On each level of organization of life (cell – organism – population – community) there exist functional codes that organize and regulate that level. The influence of linguistics

²³ It should be noted that such a broad concept of language was also used by Juri Lotman and many other scholars at that time. In the later biosemiotics, however, ‘language’ is mostly understood as a special type of sign systems that includes symbols and is almost uniquely specific to humans.

to biology may include not only the direct application of linguistic conceptions for studying the distribution of biological information, but also the application of models in which living systems themselves, for instance ecological communities, are taken as sign systems. (Levich, Mikhailovski 1979b: 126)

Язык можно считать характерным свойством живого: любая живая система имеет язык, т.е. специфические средства коммуникации. На любом уровне организации живого (клетка – организм – популяция – общество) существуют организующие и регулирующие этот уровень функциональные коды. Влияние лингвистики на биологию может состоять не только в прямом применении лингвистических концепций и аппарата при изучении процессов распространения биологической информации, но и в использовании моделей, в которых сами живые системы, например экологические сообщества, рассматриваются как знаковые системы.

This certainly demonstrates the role of A. P. Levich in the history of connecting biology and semiotics.²⁴

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²⁴ I thank the members of Group β, Elena Gorokhovskaja, Alexei Sharov, Leonid Zhukov, and George Mikhailovsky for their help and friendship. (IUT2-44.)

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