ИССЛЕДОВАНИЯ

The Evolution of Theoretical Views of Vladimír Novák: from Lysenkoism to Epigenetics

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The paper presents the case of Czech evolutionary biologist Vladimír Jan Ámos Novák, the author of the theory of sociogenesis. He is an example of how the theories of heredity and evolution were changing throughout the post-War development in Czechoslovakia in the Czechoslovak Academy of Sciences. He started his career as an entomologist working in the field of endocrinology and trying at the same time to develop the Lysenkoist term "vernalization" on the Antherea butterflies. To be able to work with T.D. Lysenko himself, Novák illegaly escaped to the Soviet Union. Later on, he developed his own evolutionary theory of sociogenesis leaving the positions of Lysenkoism and approaching epigenetics. Finally at the end of his career, he developed multilevel theory of heredity with strong epigenetic constituent thus completing his transformation from Lysenkoism to epigenetics.

Keywords: Epigenetics, Lysenkoism, Czechoslovakia, Vladimír J.A. Novák, Sociogenesis, Sociobiology.

In the times of the government of the Communist regime, Czechoslovakian biology — in accord with the Soviet science, both ideologically and institutionally — was throughout its existence more or less under the survey of political structures. Some disciplines had smaller political potential and the power influence over them was executed rather personally, but this was not the case of evolutionary biology which, for the Communist ideology, meant a considerable ideological "capital". This was so on account of the question of heritability which might enable the acceleration of improvement of population by means of the right kind of education, or simply on account of the general question concerning the evolution of the living, the direction and mechanism of its development, touching the fundamental ideas of Engels' dialectics. Therefore, the scientific development of this field was in fact independent on the political-ideological development. The prominent people of the biological science and scientific institutions of the time, such as the Czechoslovak Academy of Sciences were thus invariably copying the progress of biological theories and theories of heritability in the Soviet Union. In the area of evolutionary biology, which was very much related to the questions of heritability and thus best reflects

the changes and transformations happening within Lysenkoist biology, one man stands out: Vladimír Jan Amos Novák[1].

Creating New Science

Vladimír J.A. Novák (1919–1997) was rather a person of theory, devoid of any kind of significant political influence, but, on the other hand, he was working since the 1950s till the end of the Communist dominance in Czechoslovakia in the 1980s. While studying at the secondary school, Novák was already notable for his talent for zoology and, first and foremost, for entomology, in the area of which he published influential taxonomic work even before he started his university studies. At the university he was devoted predominantly to entomology, and after having finished his studies, he amalgamated his research on insect with the newly developing field of endocrinology. Endocrinology was actually the only experimental field of study which he explored systematically in his science career. Novák joined the Communist party after the war and became a political activist in his local organization as well as a deputy of the Communist party at his home university[2]. In his scientific career he enjoyed a great deal of success as an entomologist, and for his scientific achievement he obtained in 1949 a stipend at the Cambridge University in Great Britain which enabled him to study under the leading scientist in the area of insect physiology, Vincent Wiggelsworth (1899–1994) — this came about a year after the Communist triumph in Czechoslovakia and the closure of the borders with the neighboring non-Communist lands. He stayed at Cambridge for ten months while working in a group of researchers devoted to studying the juvenile hormone, the results of which he consequently brought back to Czechoslovakia where he founded, as a pioneer, the studies of this hormone and related topics of the changes in insect ontogenesis (Novák, 1966; Landa, 1999).

Nevertheless he dreamed of traveling to the USSR because he thought that the new post-War science in the Czechoslovakia was still too young and unable to offer him many research opportunities as it would in the USSR, where he thought the most marvelous research was going on and new revolutionary laws of the living world were being revealed. Thus he planned to go to the USSR as an endocrinologist, aiming to work with the most significant personalities of the contemporary science. Endocrinology was very promising on account of its practical applications in the applied entomology due to the possibility of changing the ontogenesis of insect and therefore, for instance, suppressing the development of certain pest. For Novák, though, there opened yet some other promising possibility. In this period, Novák was already a diligent student of the works on biology from the Soviet Union and he became fascinated especially by Michurin biology of the transformation of plant as well as animal characteristics, and likewise he did not miss the rising star of Trofim D. Lysenko. Endocrinology seemed to be an excellent complement to these theories because it offered explanations of the mechanism as well as particular possibilities regarding how to influence the ontogenesis of organisms via the levels of individual hormones. For these reasons, Novák decided to join this scientific discipline with the Soviet "successes" in the field of changes of species into one synthetic approach. And because he admired Lysenko's works, his published results and future visions, he decided to work on

[1] This work was supported by the Grant Agency of the Charles University in Prague (GA UK, nr. 283111/2011).

[2] See Archive of the Academy of Sciences, Czech republic, personal folder V. J. A. Novák.

Fig. 1. Vladimír J. A. Novák

the topic of vernalization together with Trofim D. Lysenko himself. He hoped that, as an experienced entomologist, he could vernalizate the silkworms (*Antherea* butterflies) to increase the production of its silk. Therefore he filed a request for a stipend to provide him with the possibility of studying and researching in the Soviet Union but it was turned down. Convinced of the superiority of the Soviet science and of the necessity to work directly with the best minds of the field, in February 1951 Novák left to the Sovient Union illegally on his own risk, hoping that he might be allowed to study and work on the issue of vernalization.

Illegal immigrations across the borders were nothing unusual in Czechoslovakia but all of them led to the opposite side — westward. Therefore, Novák was the only Czechoslovakian and probably also the only world scientist who illegally emigrated into the Soviet Union so that he could study with Lysenko. As Novák's wife and some of his friends testified later on, Novák went directly to Lysenko himself, because he thought that only by his side he would have the best conditions for his work and would find the answers to his questions better than anywhere else. It is now probably impossible to learn particularities of Novák's escape/emigration; fragmentary information are nevertheless preserved in the Security Services Archive of the Ministry of the Interior of the Czech Republic. There we may find several reports documenting Novák's stay in the USSR as well as evidence and pleading letters from his wife interceding at the Security Services for Novák's early return[3]. After having left, Novák was discovered by police services in the territory of the USSR and captured. For the whole year that followed, his fate was completely unknown — at least for Czechoslovakia — and a report on Novák came through

[3] Security Services Archive, Ministry of the Interior, Czech republic, i. nr. 302-206-15.

into Czechoslovakia as late as in January of 1952, when the National Security canceled their inquiry after Novák. The reports received in Czechoslovakia imply that right after his capture, Novák went on a hunger strike and had to be force-fed. He refused to cooperate with the investigative authorities in any way and therefore, they came to consider him a spy and treated him accordingly — justly, with regards to his recent stay in England. According to a later evidence among his friends, Novák ended up in an unknown gulag and was transported back to Czechoslovakia after 15 months. After being handed over to his homeland, Novák was placed into a prison hospital on the grounds of an illegal transgression of the state borders — however, the prison doctors found him unfit for investigation and recommended further medical treatment. The investigation of the issue did not continue because Novák was still on his hunger strike and refused to talk to anyone. For the entire period since his escape, his wife had been trying to find out about her husband's fate and kept writing letters to competent authorities in which she wrote a lot about his mental disorder resulting from overstrain, and depressions which her husband was supposed to treat at a psychiatrist's. Her husband allegedly kept on talking about studying in the Soviet Union, expressing thereby his wish to concentrate on the methods in breeding silkworms. The family did not see Novák until he was handed over to home treatment in the latter half of 1952.

The files on Novák's life after his retirement for home treatment are silent though, but it is possible that this affair had an immediate aftermath for Novák, as it can be deduced from his four-year abandonment of the membership in the Communist Party, which was renewed for him as late as in 1957, and from his departure from the university[4]. The whole affair was finally closed as an effect of mental problems and Novák finally returned both into the Party as well as into life in science. Nonetheless, this story well illustrates his passion for Michurin biology and his admiration for Lysenko, as well as his extremely rigid attitudes which he practically never changed till the rest of his life. The particularities of Novák's character can be also gleaned from the list of things preserved by the police, which Novák meant to carry with him on his Soviet journey. Except for practical things such as a Czech-Russian dictionary, there were on the list also books concerned with Michurin biology and contemporary Czechoslovakian textbooks on the transformation of animal characteristics, or a symposium of works criticizing Mendel's genetics.

The science politics

After his peculiar USSR adventure, Novák withdrew into privacy for several years and then came back to his scientific work which he conducted in peace and quiet at the Institute of Biology and later at the Institute of Microbiology. His scientific results as well as his loyalty to the management of the Academy enabled him to gradually establish an independent workplace within the Czechoslovak Academy of Sciences. Novák was an outstanding organizer and he knew the ropes in the scientific environment. He held a high position within the Academy and was able to push through a great deal of advantages for himself. That was why he managed to create and preside an independent institute in the Czechoslovak Academy of Sciences to work solely on the topics of evolution and heredity. During the function of the Academy in the Communist period, Novák's workplace was the only place in Czechoslovakia where it was possible

[4] Archive of the Academy of Science, Czech republic, personal folder V.J.A. Novák.

to carry on research on these topics. The first attempt to establish a workplace and research laboratories in the 1960s failed because his plans stayed only on the paper at the time. As he did not succeed in the 1960s, he did so in the 1970s when he managed to create the Department of Evolutionary Biology at the Microbiology Institute. It was no accident that the foundation of an independent workplace for evolutionary biology was successful in the 1970s, politically a very tough time for many scientists. It was the time of scientific and social "normalization" after the Warsaw Pact armies invaded Czechoslovakia in 1968. This moment brought Czechoslovakia again closer to the field of influence of the Soviet Union, and only politically devoted scientists could survive these times without putting their career at stake. Novák did it very succesfully and from the 1970s he was the director of his own department where he could study the questions of heredity and evolution only. With the exception of only few colleagues, he had free space for executing theoretical work on these questions. The result of this work was further developing his sociogenesis theory, his heredity theories, and some other minor ideas related to the sociogenesis theory. Although small, it was a unique place in the Czechoslovak Academy of Sciences, and he had a full opportunity to do theoretical genetic research. Created in 1975, it continued until 1985 when the Department became an independent Institute of the Academy now called Laboratory of Evolutionary Biology.

This Laboratory was the continuation of the previous workplace, with the only difference that now it was an autonomous department, wholly independent of all other departments of the Academy. Novák was not subordinate to anyone and thus he had an enormous freedom in his research on evolutionary topics. Therefore he was the only person in Czechoslovakia who could study evolution full-time, as well as questions related to evolution including genetics. To accompany him, he himself selected few colleagues from various fields of science from physiology through biochemistry to paleontology, who furnished him with observations and research in their own areas of study, and in fact helped Novák to build his theories. The Laboratory itself was, however, not very large, sustaining only about 20 stable employers-researchers on average[5]. But still it was the largest independent institute for evolutionary biology in all Czechoslovakia, and the only of its kind. Being the loyal Communist and major scientist he was, Novák was allowed to travel abroad as well as to use the Western scientific literature which was unavailable for the majority of the rest of scientists. Apart from recent scientific literature, Novák also brought back with him from his travels abroad contacts with distinguished scientists from all the world, and he was, among other things, a friend of his ideological adversary, Edward O. Wilson, thanks to whom Novák was one of the first — if not the very first scientist in the Eastern bloc — who was allowed to read and own his revolutionary and very controversial book *The Sociobiology: New Synthesis*. After all, his work is explicitly determined against Wilson's sociobiology, understanding it as its opposite end.

In the Laboratory of Evolutionary Biology and also in his previous department Novák, besides his work on evolutionary theory and heredity, tried to spread his word further to the world. That was the reason why he organized a great deal of conferences and workshops in the 70's and 80's — six big conferences with attendance about 80 people, and four smaller workshops with slightly smaller attendance, in toto. Interestingly, these conferences were intended not only for scientists from the Eastern bloc but also for distinguished Western scientists. Novák's meetings started to become well-attended and dozens of major scientists from all the world would come every year. The topics of the meetings were mainly from the field of evolutionary theory, genetics, morphology and also philosophy. Philosophy talks were always held by Novák himself

[5] Archive of the Academy of Science, Czech republic, i.nr. Laboratoř evoluční biologie, folder 9.

because he saw the Marxist philosophy as a necessary part of natural science. There were talks on philosophical importance of evolution, Marxist methodology, and philosophical aspects of biology in general — for instance Novák's theory of sociogenesis was often presented at the start of the meeting. The aim of the conferences was to join the two worldviews — the Western and the Eastern science — into a new scientific synthesis. Novák understood these meetings as a fulfillment of his "bridge theory", i. e., a theory according to which Czechoslovakia as a central European country and a country bordering with the western world could become the meeting point for scientists from both East and West where they could exchange their ideas and discuss their theories. Novák was of course convinced of his truth and of the truth of the Eastern science, and hoped that his meetings could persuade the Western scientists of core theories such as the inheritance of acquired characteristics or the importance of mutual cooperation in evolution. He hoped that by means of presenting these theories and by an empiric demonstration of them he could spread the Eastern science into the Western countries and hereby launch a new era of research. He was convinced that evolutionary biology and genetics are in the hands of politicians in the Western countries, not taking into consideration any kind of information that does not fit the ideological image of the West. Thus, he enabled the Western scientists to visit the Eastern bloc where they would present their thoughts and research; on the other hand, though, he was trying to convince them of his truth while hoping that one day the result might be a huge synthesis and an overcoming of the barrier dividing the Eastern and Western science. The list of the conferences is following:

General Problems of Evolutionary Biology — Liblice 1975
Natural Selection — Liblice 1978
Evolution of Man — Jáchymov 1980
Evolution and Environment — Brno 1981
General Questions of Evolution — Liblice 1982
Adaptation, Behaviour and Evolution — Liblice 1983
Evolution and Morphogenesis — Plzeň 1984
Behaviour as one of the main Factors of Evolution — Liblice 1986
Towards a New Synthesis in Evolutionary Biology — Praha 1987
Evolutionary Biology. Theory and Practice — Plzeň 1990

Novák did not pressure the participants of his conferences in any kind of way, and did not force them to present only such results that fit into his overall opinion. This is why these conferences represented a wholly unique environment in the Eastern bloc, where the Eastern and Western science could meet up freely and without political limitations or interference. For the Czechoslovak scientists and those from the Eastern bloc in general, this was an exceptional opportunity to meet and talk to the Western scientists, whose publications were not available in their respective countries. For the Western scientists it was an opportunity to figure out how things stand in the isolated Eastern block, to get inspired or perhaps find keen listeners for their alternative theories or researches that were not widely accepted yet. Novák therefore created a unique melting pot of ideas and broke the isolation of the two blocks. And yet his conferences were not focused on a single narrowed-down topic, they were always concentrated around very universal topics such as evolution, morphogenesis or behavioral science, which would be umbrella terms for a large span of topics — from chemistry to linguistics.

Motivational drive of the conference participants was diverse. Some of them were merely curious to know what kind of science is being conducted here, and at the same time they wanted

to make use of the opportunity to visit the rather inaccessible Eastern bloc. Others wanted to present their latest scientific findings and compare them with those of the Eastern bloc, get inspired and maybe find a new view upon the topic as the works of the scientists from the Eastern bloc were hard to find or totally absent in the Western countries. A great deal of participants would come to attend the conferences because their theories and ideas were not regarded as fruitful in their home countries and so they were trying to find a new audience that might appreciate them better. Such was the case of the scientists who were busy in the field of evolutionary biology, genetics, molecular biology and related field of knowledge and who were driving against the Neo-Darwinism that culminated in the Western world at that time.

The attending scientists were not second-rate or even unknown. A lot of prominent guests came to attend and have a talk. For instance, Francesco Ayalla, the geneticist and the US president adviser, who had talks about morphogenesis and general evolutionary laws; the geneticist Dmitry K. Belyaev who was famous for his red fox (*Vulpes vulpes*) breeding experiments; the biologists Alexandr Oparin and Sidney W. Fox who were the leading scientists in the field of researching the origin of life. Also, many anthropologists attended the conferences, like Vittorio Pesce-Delfino from Italy, Becky A. Sigmon from Toronto, and Morris Goodman from Michigan who was the pioneer of immunological and genetic basis of the theory that chimpanzees and humans form sister phylogenetic groups. Later on he became known for his molecular biology research and for having applied the molecular phylogenetics as the method used for deciphering the evolution based on DNA analysis. Other prominent guests were for example Günter Paul Wagner, the evolutionary biologist and ecologist from Vienna and later Yale professor, Harry J. Jerison, the behavioral scientist form California, Charles H. Gimingham, the botanist and later the president of the British Ecological Society, Alexander N. Studitsky, the distinguished Soviet biologist, or Howard E. Gruber, the psychologist and cooperator of Jean Piaget. Novák was also in contact with Stephen J. Gould and Edward O. Wilson but these two have never come to any of his meetings.

Among his frequent guests were Mae Wan-Ho, the geneticist and biochemist from San Diego and later working at the Open University conducting research in the field of epigenetics. In her speeches she would criticize Neo-Darwinism. Peter Saunders from the King's College London and their colleagues also attended frequently. They used these meetings mainly to spread and develop their ideas on epigenetics. They shared with Novák the basic assumptions about heredity. Novák's theory of multilevel heredity was actually almost identical to those held by Wan-Ho and Saunders. These meetings also served as a meeting point for the whole "Osaka group". This group of geneticists and biologists from Japan called themselves Group for Study of Dynamic Systems, and most of them worked in the field of epigenetics — namely for example Susumu Ohno, whose book Evolution By Gene Duplication became a classic in evolutionary biology. The idea of gene duplication shares some common presumptions with those of Novák's, and these conferences provided an opportunity to share these ideas. Other Japanese scientists included Koichiro Matsuno, the biophysicist and biochemist, the molecular biologist Seiji Yuasa, Akihiko Shimada, Masami Hasegawa, and others.

The conferences were a suitable place for Søren Løvtrup, the Swedish biologist well-known for his theory of macromutation as opposed to the „micromutationist" Neo-Darwinism, and Marie de Issekutz Wolsky with Alexander Wolsky, two evolutionary biologists focusing on epigenetics and later the authors of The Mechanism of Evolution. Therefore, the conferences attracted people whose thinking was similar to that of the Czechoslovak "creative Darwinists" despite the fact that these people lived in the Western countries. Their aversion towards accepting the contemporary mainstream opinion of the Western biology drew them closer to

the biology of the Eastern bloc and they in fact became the colleagues of Novák. At this time, these Prague conferences seemed to be an environment that felt more natural than their home universities. But not only scientists would attend. There were also historians and philosophers who would come over to attend the meetings. For example, the American philosopher and historian of biology Michael Ruse was giving talks about the history of evolutionary biology and Darwinism, the German historians of science Ilse Jahn and Rolf Löther, or Soviet historians Eduard I. Kolchinsky and publishing thesis by Mikhail B. Konashev.

There were English proceedings made out of every conference with full articles. But these proceedings were published in Czechoslovakia in small numbers without any other works being published outside the Eastern bloc. Unique as these meetings were, they were also very isolated and concentrated around Novák's department and the circle of the attending scientists. On the other hand, the works of Susumu Ohno became very much known and also works of Sidney W. Fox or Mae Wan-Ho were highly cited in those days. Thus, Novák's opinions were much better spread by some of the conference participants than by Novák himself.

Sociogenesis or Natural Communism

After the fall of Lysenko in Czechoslovakia, which is marked by the international symposium on Mendel in 1965, Novák continued in his evolutionary work and because he did not have to leave science in the era of "normalization", the next phase of his development illustrates the transformation of Lysenkoism into the so-called Creative Darwinism in Czechoslovakia up till the end of the Communist regime. In order to illustrate the further development of Novák's opinions on heredity, with him being an eminent evolutionary biologist of Czechoslovakia, it is necessary to elaborate in more detail on his main scientific work — theory of sociogenesis.

This theory was supposed to be the expansion of Darwin's evolutionary theory but from a Marxist viewpoint. Its title was The Sociogenesis and Novák intended it to directly oppose neodarwinism and the works of William D. Hamilton as well as sociobiology of Edward O. Wilson. The theory of sociogenesis is based on Marxist philosophy on the one hand, in the field of which Novák also published works, especially on Engels' dialectics. On the other hand, the theory draws on Russian evolutionist and morphology school in which figures the names of Karl Fjodorovitch Kessler (and also P.A. Kropotkin) or Alexandr Nikolajevitsch Severtsov. The main principles of this theory are very simple and they illustrate the contemporary Marxist evolutionist school (Novák, 1969). A specific theory of heritability which constitutes an illustrative example of the state of the contemporary Czechoslovakian "genetics" is also a part of this theory. The works of Lysenko were still used, though Novák did not rely any longer on the proof of vernalisation as he abandoned this theory after his unsuccessful adventure in the Soviet Union. Nevertheless, till the end of his career, Lysenko remained for him the fundamental evolutionary theoretician. He quoted from Lysenko's works in the explication of the evolution of the DNA and in the transition among the individual evolutionary phases which are driven by the DNA transformation. The changes of the DNA are, from Novák's viewpoint, motivated by external effects, and not by means of mutation. This means that the environment plays a key role in evolution, and the mechanism of change within the genetic information has been adopted from the tradition of Michurin biology and from the works of T.D. Lysenko.

This tradition served as a basis for the Czechoslovak biology even after Lysenko's fall. This era may be called "creative Darwinism", i.e. Darwinism which was standing in opposition

against the "non-creative Western Darwinism" that would operate with the unchanging genetic information, and the Creative Darwinists would label it as "idealistic". Creative Darwinism was not enforced politically but it was a natural evolution of the now outdated Lysenkoism. It included elements of Neolamarckism, a dialectic view of nature after the fashion of Engels, as well as modern scientific findings. And although genetics was not in the foreground of any scientific institution in the Czechoslovakia, it still remained a part of biology and partly also of medicine. Its shape was, however, somewhat specific, and from the 1960 onwards it approached the ideas that constituted the emerging epigenetics in the West, and that is why Novák's works — the works of the single Czechoslovak evolutionary biologist — were more and more edging near to epigenetic. The researchers who came to attend his conferences were often advocates of the epigentics viewpoints.

Sociogenesis (Novák, 1982) treated the evolutionary process as a progress from the lowest to the highest forms of sociability — the ability to create societies. This ability is the most important feature of adaptation because living in society is, as Novák says, much more adaptive than solitary life. This main law of evolution, as it was called, followed Kessler's and Kropotkin's "law of mutual aid". Novák's main evolutionary law affecting all living organisms is therefore very basic. It consists of one simple principle. Generally speaking, it divides the material world into five grades, or levels. These grades are scaled on the basis of sociability and the degree of unification of its parts. Therefore, life begins with single-molecule organisms similar to viruses, where an organism consists of one single molecule DNA/RNA only (and affiliated proteins). Here Novák draws on especially Oparin's coacervate theory which is supposed to be able to explain the genesis of a similar molecule and its further development, but he also operates — and that still in the 1960s — with the inanimate matter of Olga Lepeschinskaya.

The evolution progresses from basic nucleic acids to the genesis of a cell structure and a single-cell organism which is the peak of this stage and at the same time it presupposes the development of multi-cell organisms. Examples of animals at this stage may be bacteria and also the single-cell Cyanophyta, Protophyta, and Protozoa, single-cell organisms. These organisms further unify into simple multi-cell organisms and first plants and animals emerge (for instance, Thallophyta, Porifera, Coelenterata, Scolecida). Simple single-cell organisms further unify into composite multi-cell organisms, i. e. vascular plants and metameric animals. Unification of these produces the cluster of vascular plants and animals including the human society. Therefore this stage covers colonies of plants, e. g. mangroves, and higher animals living at least in some kind of social order. These degrees do not correspond to classic biologic taxonomy because the criterion here is not morphology or phylogenesis, but the degree of complexity of their social life. This is why Novák considers social insect as highly developed organisms which are, evolutionary speaking, much further than some mammals.

Thus, for Novák, unification is regarded as the main mechanism of evolution — in terms of consequences, unification is much more important than the natural selection or struggle for life (Novák, 1966, 1982). It is the communality and ability to cooperate that drives the living world. Evolutionary success is also dependent on communality and cooperation. The last level is especially relevant for illustration of Novák's goals. At the top of this level are humans and ants because the top of evolution is represented by the most cooperative animals in the living world, and Novák saw humans and eusocial hymenoptera insects as the most evolved organisms. It is just these two groups that reached the best possible position because of their excessive cooperation in society, care for children, mutual exchange of ideas and goods. But there are differences among various societies; not all should be regarded as the most evolved. At the time, Novák — as a rigid Marxist and Communist — criticised Western societies for

selfish economic plans, lack of empathy, for initiating wars for economic reasons, and for insufficient care for old and weak members of society. On the other hand, societies of the Eastern bloc — especially of the Soviet one — are much more evolved because they work towards the development of Communism, the best possible degree of unification in nature. In a prospective Communist society there is no individual being but everyone is part of something bigger, every being serves the whole as an organ in one big organism. Therefore, the Communist society represents something like a new unified organism — the superorganism. In Novák's words — a new level of evolution being developed higher than any other organism so far — level six. But there is no pure Communist society yet, thus people still remain on the fifth level with their imperfect communality, fighting wars against each other, and with big differences among individuals within a single society. That is why the eusocial hymenoptera insects, especially ants (as the most evolved eusocial insect) are in Novák's theory more developed than humans because, as he claimed, the ants finally reached the stage of Communism and live a perfect Communist life. That is why they are more developed than anything else on the planet — they are closest to the goal of evolution (Novák and Leonovičová, 1982).

Interestingly, the theory of sociogenesis in its approach is very similar to the sociobiology of E.O. Wilson. Although, theoretically these theories are totally opposite to each other. Wilson's and Novák's theories can be grasped as evolutionary biological symbols of the bipolar world of the period and it may be said that Novák was the "Eastern version" of Wilson and that his sociogenesis is a socialist version of sociobiology. The ambition of both approaches corresponds to this — the biological study of the social way of life based upon the unified and stable natural laws which do not make any qualitative differences between the most primitive societies and the most complex social organization. Both sociobiology and sociogenesis take the same direction, answer the same questions, but from different viewpoints altogether — Novák's morphological-behavioral perspective referring to the old tradition, supported by Michurin biology, and on the other hand Wilson's new genetic-mathematical perspective based upon Neodarwinist synthesis, clash with one another in the fight for the explanation of the nature of man. It is as though there were two (political) cultures colliding, trying to defend and scientifically found their own picture of mankind. In this perspective, these two persons and their work may appear to be the reflection of the "Cold War" between the Western and the Eastern bloc that is taking place on the field of science.

A very important part of this theory was the genetic component of sociogenesis. At the core of this theory was the presumption that it is not the mutability of genes and natural selection that play the main role in evolution, but that the environment, i.e. climatic and other natural conditions (such as predators), affect the organism much more than the mutability of genes (Novák et al., 1983). It is a continuation of previous thoughts based on Michurin biology and Lysenko's works, which put forward the influence of environment as an essential aspect of evolution of an organism, and which claimed that the environment itself is capable of changing the organism. In the theory of sociogenesis, the influence of an environment upon an organism has been quantified by Novák to be 99 %, and other influences, such as intraspecific and interspecific competition, partake on the development of an organism by one per cent only. The very environment is direct and fundamental factor that determines the evolution of every organism. As Novák saw it, the environment itself is capable of changing the very hereditary information. In the course of time Novák refrained from direct Lysenkoist terms and started to use terms from epigenetics which were not associated with Lysenko. To explain the mechanism of this influence, Novák developed the term "non-heredited phylogenetic changes". This term defines heredity as directly affected by the environment and explains the mechanism of

Fig. 2. Vladimír Novák and his team (fourth from right)

heredity of acquired characteristics. But this theory is not explicitly Lysenkoist nor Michurin, because Novák respects the Weismann's barrier of somatic and germline cells, and tries to join the Mendelian and Weismannian heredity with the Lamarckian view. The heredity of acquired characteristics is still not based in the classic Mendelian heredity, though. It is based on a very broad flexibility of genes. The indetermination of genes allows for an adaptation to the environment very easily, and the environment can form an organism thanks to its undetermined gene traits. Thus, not the genes themselves are inherited. Inheritance affects only the flexibility of genes and its adaptation to the environment.

This new approach of Novák's, developed in the 1960s and 1970s as a reaction to the changes within the biological sciences in the Eastern world, combines older Lamarckian ideas with new Neodarwinistic ideas. It is fully in the framework of the so-called "creative Darwinism", but it accepts some points of the Western genetic framework, i.e. the heredity of combination of acquired characteristics without destroying main genetic principles. This approach refuses the restricted understanding of genes, and Novák refuses to speak about genes as though there were one gene for one trait or a group of genes for a trait. He speaks about a system of genes, i.e. dynamic genes that are affected by the environment. He criticizes the assumption that genes themselves are the subject of natural selection, as well as the reductionistic view of animal behavior rooted only in genes. Interestingly, it was in the Western part of the world where the science of epigenetics by C.H. Waddington recalls Novak's works quite clearly. Novák's theory of heredity from the 1970s and more developed later in the 1980s is very close to the science of epigenetics. The climax of Novák's ideas is the remarkable theory

of "multilevel heredity", which was developed in the 1980s in his Laboratory for Evolutionary Biology (Zemek, Mlíkovský, Socha, 1985). The main points of the theory are that DNA cannot contain all the needed information for a trait. It means, that the information value of a gene depends on the environment of the cell, in which the nucleic acid is present, and also on the environment of the whole body — its biochemistry and physiology. Also, the genetic information always depends on the context of other genetic information. There is no individual information like in the original Mendelian heredity (Novák, 1980).

As a consequence, heredity always works in feedback with the environment that it directly affects, i.e. what genes will be used and how. This is the way environment affects the phenotype. Heredity is therefore a dynamic system of interacting information. There are no strong Michurin or Lysenkoist terms used, but the environment still affects the body as the main factor in evolution and we can change the organism by proper changing the environment. Since the end of the 1970s, Novák quotes only Lamarck and publishes a new interpretation of his works. He interprets Lamarck as a morphologist who just worked on the topic of development, and his theory of heredity has nothing to do with all the so-called Lamarckian theories. Lamarck is simply misunderstood by all the western/genocentric biologists. Lamarck could not know anything about heredity of genes and traits in the modern sense. That is why the details of the Lamarckian theory are of course wrong, but the main idea is correct. Environment is inherited — not through the change of DNA itself, but through the use of certain genes in certain environment. The difference from the previous theories is that Novák does not deny genetic principles. The core of the multilevel theory are four levels on which heredity operates (Novák, 1982):

1) Molecular level — as the DNA level used by Neodarwinists, i.e. the heredity of genes within the cell.
2) Cell level — at this level the information is affected by all the processes within the cell. The biochemistry and all the processes within the cell in general influence what information will be used and how, what genes would be expressed and when.
3) Body level — the situation of the body, its physiology and biochemistry, affects the cell and thus the genetic information. Moreover, there can be direct changes in the germinal cells.
4) Behavioral level — behaviour can affect the heredity and morphogenesis. This level is the closest to the ideas from the 1950s and the 1960s. Heredity also depends on the manner in which the organisms behave, especially if social behaviour is considered. Novák cites Dubinin and his social heredity which can affect, as Novák maintains, the genetic information by means of social behaviour which is preferred by natural selection.

Throughout these levels, or, as it were, information channels, the DNA information is used. This is how the environment affects the way the DNA is transcribed and used within the synthesis of protein. This theory implies what Novák's colleagues confirm themselves. The newest foreign literature was available in his laboratories — Novák kept an eye on the recent trends and he integrated them into his own theories. This form of creative Darwinism is loyal to the position it has held all the previous years and after simple adjustments and alteration of its terminology it was possible to publish it even in the 1960s on the one hand; on the other hand it reflected the modern genetic research in the Western world and referred especially to the just developing area of epigenetics. Even in the present days the latest versions of Novák's theory of heredity from the 1980s do not seem too conspicuous, and they do not imply in the least

that they are based upon the purely Michurin attitude of Novák's, only grafted onto the newest approaches in the world science.

As far as Novák's theory of heredity and its international success is concerned, some participants of Novák's conferences noticeably adhere to this theory of heredity. A case in point could be the above mentioned Susumu Ohno and the American geneticist Mae-Wan Ho and their publications and works which are very close to Novák's opinion. Novák himself pubished only one english book about his sociogenesis and a few papers mainly in Eastern scientific journals. We cannot say, therefore, that Novák's later ideas remained in the isolation of the Eastern bloc and died along their master. Because of the similarity to the developing epigenetics which was at the time already on the rise, as well as some alternative approaches to the contemporary Neodarwinism, we can state that towards the end of his scientific career, that is, before the fall of the Iron Curtain and the end of the Communist regime in Europe, Novák found for his theories a valid scientific niche, and that even despite the fact that its basis was a thoroughly Michurin biology of the 1950s and 1960s.

Conclusion

Novák is a case in point for the understanding of the change of heredity theories in the latter half of the 20th century Czechoslovakia. He held on to the original positions, changed only details of the theories, he adapted them to the new knowledge and the general situation in science, but the basis is still clearly original up to the 1980s and the beginning of the 1990s when he retired. He started as a devoted Lysenkoist dedicated to the Michurin manners, for which he did not hesitate to sacrifice even his very successful career in Czechoslovakia, and left for the Soviet Union only for the purpose of working next to the stars of the Soviet biology. After this unsuccessful trip and the restarting of his career, he came back to the topic and developed new theories back home in Czechoslovakia. But the 1960s were coming with the rethinking of the Lysenkoist affair. On the one hand, Novák went with the scientific stream, and did not quote and admire Lysenko's main works any longer. On the other hand, he still admired him as a classic of evolutionary biology and never forsook his ideas of the direct affect of environment and the possibility of changing organisms by the change of their environment. In the 1970s, he founded his own department and obtained academic support to do theoretical work in evolutionary biology and "genetics". He had the opportunity to transform the old theories into new ones. The result was the theory of sociogenesis — scientific Communism based on evolutionary theory as well as on heredity theories of "non-heredited phylogenetic changes", and later, the multilevel heredity theory. He transformed the ideas of die-hard Lysenkoism through the later creative Darwinism up to the theories of epigenetics. Because of Novák, the Czechoslovak Lysenkoism in the end became epigenetics.

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Развитие теоретических представлений Владимира Новака: от лысенкоизма до эпигенетики

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В статье рассматриваются взгляды чешского биолога-эволюциониста Владимира Яна Амоса Новака, автора теории социопроисхождения. Это пример того, как теории наследственности и развития изменялись в течение послевоенного времени в Чехословацкой академии наук. Новак начал свою карьеру как энтомолог, работающий в области эндокринологии и пытающийся одновременно разработать лысенкоистский термин "вернализация" на бабочках Antherea. Чтобы быть в состоянии работать с самим Т.Д. Лысенко, Новак незаконно уехал в Советский Союз. Позже он разработал свою собственную эволюционную теорию социопроисхождения, приближающуюся к эпигенетике, оставив позиции лысенкоизма. В конце своей научной карьеры он разработал многоуровневую теорию наследственности с сильной эпигенетической составляющей, таким образом завершив свой переход от лысенкоизма к эпигенетике.

Ключевые слова: эпигенетика, лысенкоизм, Чехословакия, Владимир Я.А. Новак, социогенез, социобиология.