

Berichte	Bd. 87, H. 1, 2013, S. 7–24	Leipzig
----------	-----------------------------	---------

Ferenc GYURIS, Budapest u. Heidelberg
 Róbert GYÓRI, Budapest

Sovietized science at the service of “socialist national economy”. The example of Hungarian geography, 1945–1960

Summary

Our paper is aimed to show how science in general, and geography in particular, was reorganized after World War II in a country belonging to the Soviet occupation zone. Major changes affected science at several points. First, scientific discourses became dominated by scientism. Second, science was claimed to produce “objective truth” only if it had a Marxist-Leninist approach. Third, disciplines were expected to contribute to the “construction of socialism”. In geography, “bourgeois” subdisciplines without “practical utilization” were dismantled, and “reactionary” human geography was denied. Instead, emphasis was put on issues serving the needs of economic planning, such as the socialist transformation of settlement networks, the establishment of a spatial framework for economic planning, and the transformation of nature to promote agricultural production. In addition to this, geography was also expected to participate in the propagation of these new goals. Thus, Sovietization thoroughly reshaped Hungarian geography, and changed its social, political and economic role as a field of science.

Zusammenfassung

Der vorliegende Beitrag untersucht die Reorganisation der Wissenschaften in den von den Sowjets besetzten Ländern nach dem Zweiten Weltkrieg, wobei die Geographie im Mittelpunkt des Interesses steht. Die Wissenschaften wurden von der politischen Neuorientierung in drei Punkten besonders stark beeinflusst. Erstens wurden wissenschaftliche Diskurse weitgehend vom Szientismus, dem Glauben an die Allmacht des wissenschaftlichen Wissens dominiert. Zweitens betrachtete die neue kommunistische Führung Wissenschaft nur dann als Hersteller einer „objektiven Wahrheit“, so lange sie auf einem marxistisch-leninistischen Ansatz basierte. Drittens wurde erwartet, dass die unterschiedlichen Fachbereiche am „Aufbau des Kommunismus“ aktiv teilnehmen. Demzufolge wurden in der Geographie „bourgeoise“ Teildisziplinen, die angeblich ohne „praktische Anwendung“ waren, abgebaut und die „reaktionäre“ Humangeographie abgeschafft. Die „neue“ Geographie konzentrierte sich auf Themen, die die Bedürfnisse der Wirtschaftsplanung erfüllten, wie z.B. die sozialistische Umstrukturierung des Siedlungsnetzes, die Schaffung einer aus der Sicht der Wirtschaftsplanung optimalen räumlichen Gliederung.

derung des Landes, bzw. die Umgestaltung der Natur mit dem Ziel, dass sie zu einer Steigerung der landwirtschaftlichen Produktion führen sollte. Außerdem sollte die Disziplin aktiv zur Verbreitung von Propaganda und Ideologie beitragen. Aus diesen Gründen wurde die ungarische Geographie durch ihre Sowjetisierung grundlegend umorientiert, was die gesellschaftliche, politische und wirtschaftliche Rolle des Faches stark verändert hat.

1 Introduction

After World War II, in which Hungary had fought on the side of the Axis, the country became a part of the Soviet occupation zone. A brief provisional period with multi-party elections between 1945 and 1948 was followed by the violent establishment of the Communist regime. This event marked a radical turning point not only in the history of the country but also in the sciences too. The “colonization” of science in general, and geography in particular, was carried out in several ways. The purpose and aims for research were reconceptualized, as Marxist-Leninist ideology became mandatory in research practice. Former international ties were cut, while in institutions the personnel was changed (GYÓRI and GYURIS 2012).

This shift, an obvious consequence of copying the Soviet example, had three significant consequences across the whole of science. First, scientific discourse became dominated by *scientism*, a firm belief in the omnipotence of science (STENMARK 2008). Second, although science was regarded as a supreme “mode of understanding” (MERCER 1984, 194), it was not considered neutral. Its capacity to reveal the “objective truth” was claimed now not to result from its “view from nowhere” (NAGEL 1986), but from its Marxist-Leninist approach – in Stalinist interpretation, the view from the *only* right place. Third, all disciplines were expected to produce knowledge for practical benefit: they had to contribute to the “construction of socialism”. This paper’s specific aim is to describe and contextualize these characteristics of Marxist-Leninist science, and to reveal their implications for Hungarian geography in particular. The paper’s more general aim is to make a contribution to understanding of how politics and ideology shaped geography’s intellectual content and in turn determined its social, political and economic role.

This matters because scientific knowledge is socially constructed, and political circumstances always exert influence on scientific life. Moreover, politics (the power) and science are always dependent on each other: the power needs perpetual legitimization, which is best served by science from an “objective standpoint”. Scientists, however, need permanent support in material and moral sense, which they can best receive from a power appreciating and necessitating them (MEUSBURGER 2005). This mutual dependence was especially strong in Sovietized science. The Communist power aimed at a radical transformation of society, and Marxist-Leninist scientists followed an ideology totally incompatible with those of their predecessors. Therefore, both groups needed extremely strong support from each other, which is what made them almost perfectly intertwined.

The scientism of Soviet science was deeply rooted in the philosophical materialism of Marxism-Leninism. As Stalin stressed: “The starting point for the philosophical materialism of Marxism is that the world and its laws can be understood indeed ... that there are no things in the world not to be revealed, at most which we have not understood yet, but, with the help of science and practice, we will reveal and understand in the future.” (Stalin quoted in VAVILOV 1950, 20–21)

The profoundly scientist position mirrored by these words was spread in the Communist bloc through massive Stalinist propaganda in print media, radio programs and public education. As a result, the representatives of science gained special legitimate authority (CIALDINI 2008) in all spheres of life. In addition, scientism was brought “right into the living room of ordinary people” (STENMARK 2008, 111) as part of this “long-lasting expansionist policy of science” (WUNDER 2008, 7).

This position of legitimate authority was a privilege of Marxist-Leninist scientists, who conducted their research in concert with Marxist-Leninist ideology. All other so-called representatives of science were exiled to the terrain of “bourgeois sciences”. This category not only contained “older” approaches, but also all “reactionary philosophical trends that appear in bourgeois countries under new, modish names” (GEROVITCH 2001, 257). The main dividing line between Marxist-Leninist and bourgeois science was ideological: while the former embraced all research activities based on Marxist-Leninism, research topics and methods which considered serving “capitalistic”, “imperialistic”, “reactionary” interests, were automatically categorized as “bourgeois sciences”.

Marxist-Leninist science, although it claimed to be objective, thus differed from Western-type technocratic science. Unlike technocrats who were always emphasizing their “neutrality” (MERCER 1984), science in and of the Stalinist epoch claimed to be objective since it was “developed on the solid ground of the great teachings of Lenin and Stalin” (SZIKRA 1950, 8). “Objectivity” thus was not guaranteed by the “view from nowhere”, but by a view from the only right place, where the “road of further correct development in science” could also be seen from (VAVILOV 1950, 6). Marxist-Leninist ideology also exerted significant influence on the role of science in “practical” (economic) issues. The Stalinist concept of science firmly rejected “pure science” (IVANOV 2002), and thus also “purely theoretical” scientific work. This idea had not been new in the Marxist tradition. Engels had already had the opinion that “pure theoreticians” were “rather mere reactionary apologists” (ENGELS 1991, 92). Stalinist politicians of science also internalized the words of Lenin, “the foresighted scientific genius” (ANONYMUS 1970, 129), who urged that “our science shall not remain a dead letter or fashionable phrase”, but it shall be “converted to a constituent element of life in a complete and true way” (IBID., 130). Stalin stressed that “the link between science and practical activity, the link between theory and practice, and their unity is the guiding-star of the proletariat’s party” (ANONYMUS 1949, 123).

In line with this instruction, Aleksandr Topchiev, the head scientific secretary of the Presidium of the USSR Academy of Sciences, underscored that: “the calling of the Soviet science is to help in the creation of the technical and economic foundation of communism” (TOPCSJEV 1950, 283). Thus, following MEUSBURGER

(2005), official argumentation tended to prefer the production of *factual knowledge* (*Sachwissen*) instead of *orientation knowledge* (*Orientierungswissen*). In other words, emphasis was officially put on research that created practically beneficial knowledge with a focus on “reasons, effects and means”, not “on justified aims and ambitions” (MITTELSTRAß 2001) to legitimize the ruling order.

Still, in fact, political leaders also expected science to actively participate in political propaganda. This resulted on the one hand from the inherent notion of totalitarian systems to expand political dominance over all spheres of life. For Communists, science was both a field too dangerous not to be strictly controlled and a channel of communication to efficiently mediate propagandistic aims to various strata of society. The latter had already been emphasized by Lenin, who underscored that “the dictatorship of the proletariat” was not only “a military and economic ... and administrative” struggle, but also a “pedagogical” struggle “against the powers and traditions of the old society” (Lenin quoted in OLGIN 1935, 81).

On the other hand, the political role of science was further increased by the Cold War. In this context, science and engineering were also to serve as a “battlefield” for the USSR and the USA, where both superpowers “claimed to have science on their side” (POLLOCK 2006, 13) and tried to express their presumed “superiority” through scientific breakthroughs. Joseph Stalin himself also frequently referred to this race and his expectations about its outcome. As he put it: “I have no doubts [that] if [we] give necessary help to our scientists, they will not only catch up with, but soon overtake the achievements of science abroad” (Stalin quoted in KREMENTSOV 1996, 235). Thus, science was expected to “win the war” on the “ideological front” of the Cold War (POLLOCK 2006, 5).

2 Radical changes in the structure of Hungarian geography

The changes in the general context of science had major implications for Hungarian geography. As the discipline’s role and its basic framework of approach were redefined, the inner structures and divisions of the discipline, the relative weight and the content of subdisciplines also changed. This process emulated the Soviet example, and no real opposition against the thorough adaptation of the Soviet model was tolerated.

A good example for this was the reinterpretation of the concept of economic geography. Before 1939, economic geography in Hungary was considered a branch of human geography, defined along the French *géographie humaine* (GYÓRI 2001). Pál Teleki, a pioneer of Hungarian economic geography, and, later, Minister of Foreign Affairs and Prime Minister, followed the ideals of geographical synthesis, and he identified the goal of economic geography as presenting human economic life as a part of the whole life of the Earth (TELEKI 1922).

After the communist turn, in accordance with the Soviet practice, human and physical geography were separated, and the latter was renamed (GYÓRI and GYURIS 2012). From then on, the term “economic geography” embraced all parts of the discipline which concerned society. This change had strong political reasons. Marxist-Leninists considered the unity of physical and human geography a

“bourgeois trick” that “tries to expand the effect and validity of natural rules to human society” (RADÓ 1962, 227). In their eyes, this approach was aimed to present the lower technological level of colonial peoples as determined by physical conditions (*environmental determinism*), and, thus, unavoidable. This was regarded as a means to provide (pseudo)scientific substantiation for the colonial expansion of the “imperialistic” (capitalist) states (DOBROV 1952). The Marxist-Leninist point of view was, however, not that of environmental determinism, but that of *economic determinism*. This means that human-nature relations are determined by the mode of production: the more developed mode of production a society has, the stronger is its ability to utilize and alter natural conditions for its own sake instead of being one-sidedly dependent on nature. In this concept, socialism as a “more developed” mode of production could be presented to have more mastery over nature than capitalism did. Thus, the separation of physical and human geography emphasized that the mode of production is more important for society than the physical conditions among which it lives (GYÖRI and GYURIS, 2012).

The introduction of the new term “economic geography” was also an outcome of political notions. New terminology supported Marxist-Leninist doctrine in putting production to the fore, which was an issue of fierce debate. At a 1954 session of the Academy’s scientific committee, Tibor Mendöl, a former disciple of Teleki, argued that neither population nor urban geography could be wholly regarded a part of economic geography. He instead proposed the use of “social geography” as a general term for issues not belonging to physical geography in the discipline (BULLA 1955a). Mendöl’s endeavor was also supported by Béla Bulla, who became a physical geographer in the interwar period and was a personal friend of Mendöl. The idea, however, was firmly opposed by György Markos, the main ideologist of the “new” Hungarian Marxist-Leninist geography, who thought Mendöl and Bulla were trying to bring back the old Hungarian human geography under the cover of “social geography”. As he put it: “We should state clearly that no Marxist economic geographer wishes to »locate« the old, reactionary, capitalism-serving human geography, neither some nor any of its branches in Marxist economic geography.” (MARKOS 1955, 365).

In line with these words, the autocracy of Marxist-Leninist economic geography led to the dismantling of several disciplines that had played a key role in the interwar period. In the case of political, ethnic and historical geography, the direct or indirect link with such geopolitical endeavors was obvious, thus, the demolition of these branches (and their exile from canonized scientific vocabulary) did not need detailed explanation. Theoretical issues were marginalized within the new economic geography as their research results had no “practical utilization”. As for population and urban geography, a kind of survival was evident in the fact that their reformulated, practice-oriented scientific goals could be integrated into the tight framework of the all-embracing economic geography. These new tasks were precisely formulated by the urban geographer Március Matejka, who had returned from the Soviet Union: population and settlement geography are the branches, “which choose as their subject the spatial allocation of the most important force of production – that of humans” (ABELLA 1961, 123).

Such approaches were alien to the tradition of Hungarian urban geography: humans had never before been reduced to a “force of production”, and the practical (planning) orientation of the new approach was also unprecedented. The old Hungarian urban geography, influenced by the French *géographie humaine* as well as by German *Länderkunde* and settlement geography, had had three special interests during the 1930s: towns and villages as the smallest kinds of landscape, the regularities and the development of the urban network, and urban morphology (GYŐRI 2009). None of these fields of research was incorporated into the new urban geography in the 1950s. Regional geographical research, rooted in Vidal de la Blache’s concepts, was considered erroneous, or rooted in theory harmful from a Marxist-Leninist point of view as it, according to the reasoning, related social phenomena to physical factors. It was interpreted as making no more than “certain corrections” on “pure geographical determinism” (DOBROV 1952, 7). The quantitative and, in general, positivistic research of urban networks was reckoned a deductive speculation which displayed “abstract forms, geometric shapes, schemes”, which hid the real reasons behind social disparities (ANONYMUS 1954, 780–781).

The apolitical urban morphology paradigm came under the most serious attack. The main accusation levelled at it was that morphology is an empty, “formalist”, art-for-art’s sake investigation with no connection to practical issues such as urban network planning. It was regarded an especially serious misapprehension by Antal Vörösmarti that Hungarian urban geography (i.e. Tibor Mendöl) linked social and economic characteristics of urban population to morphological types of urban layout – a method giving the false impression that morphological and functional researches can be joined up (ABELLA 1961, 124–125). Besides, the “analysis of small formal questions” was judged an approach that “does not see and does not desire to see the content and the process behind form” since “it can serve capitalism the best this way” through diverting the attention of the scientific community or broader society away from the severe contradictions of capitalism (MARKOS 1955, 362).

Morphological studies became problematic not only in urban geography but in physical geography as well. After 1945, Hungarian physical geography had to distance itself from the morphology of Davis and Penck as these concepts traced surface development back to cyclical processes (Davis) and to quantitative change (Penck). These contradicted Marxist-Leninist teachings which regarded the concept of linear development as dogma. Béla Bulla made an attempt to fit the principles of geomorphology to Marxist-Leninist dialectic through interpreting the “necessarily rhythmic process” of surface development as “the realization of the dialectically controversial development of the surface and the interpretation of the essence of development” (BULLA 1955a, 104). György Markos, however, rejected this stance, stigmatizing it as formalist and emphasizing that physical geography should also have practical orientation. For him, “It is not the only point to interpret forms on the surface of the Earth, but to utilize and, if necessary, change them for the sake of society.” (MARKOS 1955, 362).

3 The practical goals of Marxist-Leninist geography in Hungary

The Hungarian communist leadership was keen to emulate the Stalinist model in order to make Hungary the “best disciple” of the Soviet Union within the communist bloc. While doing this, the chief party leader Mátyás Rákosi and his right-hand man Ernő Gerő, Minister of State, strongly argued against any divergence from the Soviet model. As they put it, “the basic features of socialist construction in the Soviet Union are universally valid”, so “there are no specific national roads to socialism” (quoted in SPRIANO 1985, 304). Thus, Hungarian science was expected to strive for the same goals as its Soviet counterpart. However, the leadership found this impossible without a thorough transformation of science in Hungary. In Gerő’s words, the “old” Hungarian science often “diverged from real life”, and “closed itself in its own tight ivory tower” (GERŐ 1950a, 345). For him, the People’s Republic of Hungary needed a science aimed at “the efficient participation in the realization of our five-year plan, ten-year electrification and irrigation plans, and in the ascension of our country” (GERŐ 1950a, 348).

In other words, Hungarian science – similarly to Soviet science – had to contribute to the realization of greater communist goals. Geography was no exception: physical geography, after identifying and understanding the rules behind processes in the geographical environment, had to transform nature in relation to the needs of the society. Economic geography was responsible for rational allocation of the population and production in space (ABELLA 1956). In the case of Hungarian (economic) geography, the main aims were threefold: the development of Hungarian urban and rural systems (with a special emphasis on the issue of “scattered farms”); scientific identification of the economic regions of the country (so-called “rayonization”), and the transformation of nature in order to improve agricultural production. The political leadership had high expectations: as Gerő stressed, they “[aimed to] change the socioeconomic map of our country.” (GERŐ 1950b, 576).

3.1 *Socialist transformation of the urban network*

In accordance with the “new geography’s” main objectives, communist urban and rural development policy in Hungary was responsible for creating a “more rational” spatial framework for production. But it was also considered a tool for the radical and voluntaristic transformation of society. The main aims were the creation of “socialist towns” (new industrial or newly-industrialized centers dominated by the working class), the gradual disappearance of the urban-rural divide and – after that of the cities – the “socialist transformation” of villages (HAJDÚ 1992). Emphasis was put on the development of new industrial towns, which was seen as a necessary precondition for accomplishing the First Five-Year Plan (1950–1955). As Mátyás Rákosi, radiating trust in the omnipotence of Marxist-Leninist science, pronounced in 1949, “this plan aims to develop the Hungarian industry in a five-year period as much as it grew in the 50-year period before” (RÁKOSI 1951, 14).

The most pressing issue for urban geography to solve, however, was the problem of scattered farms (*tanyas*) on the Great Hungarian Plain. These had had come into being after Hungary’s liberation from the Ottoman occupation in the late

seventeenth century, when a gradual resettlement of the deserted areas began, especially after the abolition of serfdom in 1848. Peasants, although remaining inhabitants of the rural towns, established small farmsteads on the property they owned, which they could use as temporary accommodation during the agriculturally active periods of the year. As a result of the demographic boom in the late nineteenth century, more and more scattered farms became permanently inhabited, a process accelerated by the 1945 land reform (BELUSZKY 2006). At the end of the 1940s almost 900,000 people were living in scattered farms (HAJDÚ 1992). The issue was thus a serious challenge for the communist system, even though the scientific (and political) debate on the topic had been apparent in Hungarian human/economic geography since the interwar period.

In fact, two possible solutions had emerged as early as the 1930s. In the first view, the scattered farms and agricultural towns were strongly interconnected, and the peasants – having houses both in the farm and in the town – enjoyed the benefits of towns and an efficient agriculture. Hence, this “Great Plain type” urban development was suggested to be promoted more widely in Hungary (ERDEI 1939; 1941). A leading representative of this approach was Ferenc Erdei, who belonged to the most productive “sociographers” of the interwar decades and was a founder in 1939 of the Nemzeti Parasztpárt [“National Peasant Party”], a moderate left-wing political body. In contrast, urban geographer Tibor Mendöl argued that the relation between the scattered farms and the agricultural town outlined by Erdei had already vanished: scattered farms had already seceded from towns, even with respect to everyday social relations, and so had become functionally independent settlements. They did not, therefore, offer to their inhabitants the benefits of towns, but their sporadic form made the implementation of a modern infrastructure (electrification, transport, education, health care) more difficult. Thus, Mendöl argued, they should be demolished and the construction of planned villages should be arranged (MENDÖL 1939; 1941).

Although the interwar years witnessed instructive scientific debates on the issue, no real steps were taken. The number of inhabitants living in scattered farms dramatically increased after the 1945 land reform, however, and it was a main aim of the post-war political regimes (even those before the “communist turn” in 1948) to carry out a thorough reform of the administrative system. Some initial steps in 1945–1948 were manifest in the creation of new local administrative units from groups of scattered farms formerly belonging to nearby agricultural towns. Then, the communist Ministry of Interior established the Preparatory Scattered Farm Committee in 1948. The committee, and from 1949 on, its successor, the Scattered Farm Council, were responsible for the solution of the “scattered farm” problem. Ferenc Erdei (who, becoming a communist from a moderate left-wing politician, and was also appointed the Minister for Agriculture in 1949) was personally asked by Mátyás Rákosi, the leader of the communist Hungarian state, to lead the council (HAJDÚ 1990/91). Erdei accepted, but nevertheless the council (in accordance with Soviet concepts of urban development) had to follow a strict policy of demolishing scattered farms and organizing them into villages. Such a solution was diametrically opposed to Erdei’s interwar concepts and, in fact, more similar to those of Tibor Mendöl, who, incidentally, was suppressed by the communist system

and whose belittlement was partly due to Erdei (GYÓRI 2009). Yet, the council’s initial plans on the infrastructural development of the new villages mostly remained unfulfilled. After several years of gradual decline thanks to the lack of proper coordination and waning interest among political leaders, the council was officially disestablished in 1954. Nevertheless, it had a decisive role in opening a new, explicitly “anti-scattered farm” (and, actually, anti-rural) chapter in the history of Hungarian urban development. This, too, exerted a strong influence on the relating scientific concepts of the next decades (HAJDÚ 1990/91). Thanks to the fact that Ferenc Erdei, the well-known and respected sociologist, undertook the leading of the council, the “socialist solution of the scattered farm issue” (in fact, their demolition) could be legitimized as “the scientific solution” of the question (Ibid. 1990/91, 120–121).

3.2 *Establishing a spatial framework for socialist planning*

Besides the “socialist planning” of the urban network, another practical issue of Hungarian economic geography was to identify the economic regions (*rayons* in the Marxist-Leninist terminology) of the country that were intended to become the effectively functioning spatial units of production. Rayonization had a strong tradition in the USSR: it was one of the matters that had brought Marxist-Leninist economic geography into being there during the early 1920s, and it had gained in importance there as early as before the 1940s (GYÓRI and GYURIS 2012), for two reasons. First, the identification of economic regions, together with the review of their environmental conditions and economic potential, was a crucial prerequisite for the long-term development of the USSR. Second, rayonization served propagandistic goals by emphasizing the “conscious” and “methodical” character, and therefore also the superiority of the communist regime. Rayons (economic regions) were regarded as the tool for improving an efficient cooperation among units of production, characterized by different conditions.

Although a coherent set of principles never crystallized for rayonization (cf. ENYEDI 1961; BELUSZKY 1982), rayons were basically expected to have a sort economic specialization on activities they had favourable conditions for as well as to meet the criterion of “complexity”, thus, the “proportionate development of branches of production” (KRAJKÓ 1982). Since the latter seemed possible to be realized only for large regions, the number of rayons never exceeded 32 for the whole Soviet Union (HORVÁTH 2008).

Some three years after the “communist turn” in 1948, the basic principles of rayonization were also introduced into the Hungarian geographical discourse by György Markos. He laid down the theoretical principles of the issue in 1951, followed by his hypothetical rayon system of Hungary one year later (MARKOS 1952a; KOLTA 1954). Markos followed the relevant Soviet concepts in all respects; in his interpretation, rayons were intended as “adequate spatial units of production for spatial planning” (quoted in KOLTA 1954, 201), set along scientific principles. Some other supporters of rayonization went even further. János Kolta argued that, after a while, rayons should also become administrative units “unconditionally” (KOLTA 1954, p. 203). The issue of economic regionalization was introduced into Hungarian economic geography very rapidly. Thanks to this, to the country’s real

administrative challenges and to the political pressure prevailing in scientific life, the next 10–15 years could be characterized as “the decade of rayonization” in Hungary (BELUSZKY 1982, p. 4). In these years, each economic geographer who wanted to matter in the discipline made their own concept or at least tried to add to the discourse (BELUSZKY 1982).

Rayonization, however, never became a successful feature of Hungarian geography. Some geographers cautiously argued that it was impossible in such a relatively small country to identify “specialized” *and* “complex” economic regions similar to those in the USSR, and that the whole of Hungary could be regarded as one (complex) rayon. This argument was emphasized mainly by Béla Bulla, who moderately but unambiguously criticized Markos for the too early introduction of the issue. As he stressed, “in the absence of the necessary theoretical and practical foundation it had been impossible to succeed in the creation of a plan being acceptable for national economic planning.” (BULLA 1955a, p. 110). In fact, this was a common criticism in several East European communist states. The East German economic and political geographer Heinz Sanke, later a member of the academy of the German Democratic Republic, was of the same view. And so was Anastas Beshkov, the Bulgarian economic geographer and fellow of the Bulgarian Academy as well (BULLA 1955b). Nonetheless, others were convinced of the opposite. The most sophisticated counter-argument in Hungary was given by Gyula Krajkó, a main supporter of the rayonist concept. Krajkó underlined that what was important was neither territorial extension nor the number of branches of production. For him, complexity was determined rather by the relations of production and the development of productive forces. In his view, even a small country could be divided into complex economic subunits, at least if it was a socialist one (BULLA 1955b).

In general, several theoretical questions concerning the rayons remained open, and results were contradictory. The number of rayons identified for Hungary, for instance, varied among authors on a broad scale from 6 to 13 (BELUSZKY 1982). Meanwhile, the question of further significant transformations in the spatial framework of public administration was dropped (Ibid. 1982). Hence, although a university research group, led by Krajkó, continued with rayonization at the University of Szeged, a few other experiments were conducted, and the issue surfaced once more as part of a special review issue in 1982 (BELUSZKY and SIKOS 1982), most relating researches died away gradually.

Overall, rayonization in Hungary (and in other East European countries) was a highly doubtful scientific project which totally ignored the economic conditions of the communist “satellite states”. Still, for political reasons and considering the “practical” character of the issue, the discipline of geography was forced to divert considerable resources to rayonization.

3.3 The transformation of nature

The third major practical task, the realization of which was partly a responsibility of the Hungarian Marxist-Leninist geography, was the transformation of the country’s natural conditions in order to improve agricultural production. This endeavour focused on three topics: grandiose irrigation projects; the creation of

forest belts protecting the soil from wind erosion; and the naturalization of new species of plants. The initiative was influenced by the “Stalin Plan for the Transformation of Nature”, initiated in the Soviet Union in 1948 (HAJDÚ 2006; BRAIN 2010). In a theoretical sense, both concepts were based on a kind of economic determinism which dominated Soviet geographical thought (GYÖRI and GYURIS 2012), and on a firm belief in Marxist-Leninist science. As Mátyás Rákosi put it: “The country of socialism is the country of unlimited possibilities.” (quoted in HAJDÚ 2006, 250). Marxist-Leninist geographers were keen to give scientific substantiation to the chief politicians’ concepts. György Markos again played a crucial role in the story: in 1952, he provided a detailed Hungarian scientific interpretation of Stalin’s theories on human-nature relations and on the transformation of nature (MARKOS 1952b).

The National Planning Office was assigned to prepare a 10-year irrigation plan for Hungary as early as 1948. The concept mainly focused on the Great Plain, the most fertile agricultural region of the country but with frequent droughts during the summer. Special emphasis was put on the transformation of physical conditions in the Hortobágy region, the driest one in the Great Plain. In order to solve the problems of this region, a planning committee (Tiszántúli Természetátalakító Tervbizottság – “Planning Committee for the Transformation of Nature in the Tiszántúl Region”) was established in 1952. One of the committee’s members was Ferenc Erdei, who was at the time also the president of the Scattered Farm Council. Such irrigation plans were not new: earlier initiatives aimed at the construction of three dams and irrigation works in the Hortobágy region had been underway since the interwar period. The main difference between the old and new projects was their scale and pace. Since the process of construction could not meet the irrational expectations of the communist political leaders, the irrigation project could not be fulfilled totally (IBID. 2006). Similar challenges were faced by the large-scale afforestation proposals: directives were unrealistic and the project lacked adequate theoretical preparation (HAJDÚ 2006).

Still, although these projects proved impossible to carry through due to their unrealistic scope, their main notion was technically realistic and only failed because of a lack of money, labor force, and devices. Some other initiatives of the Stalinist regime were, however, incompatible with natural conditions that human agency cannot alter radically. The most significant example of this was without doubt the naturalization of new plants. Although experimentation with the introduction of new plants has a long tradition in the history of agriculture, and attempts in Hungary had already been undertaken before World War II, the initial phase of small-scale experimentation had always been slow and cautious. But where economic profit had motivated these smaller schemes, the communist regime considered the naturalization of new plants a crucial political issue, and devoted enormous financial and institutional resources to its successful accomplishment.

This can be seen clearly in the case of cotton, an emblematic plant in the initial decade of communism in Hungary. For economic reasons, small-scale experiments with the production of this crop had been conducted during the interwar period, but were soon cancelled. The issue of naturalizing cotton emerged again in the late 1940s, and became a main goal of the new regime. After the decree of the Council

of Ministers in 1948, the next year witnessed the establishment of the so-called Council for Cotton Production and the beginning of experimentation on some 850 acres, with the plan of increasing the sown area to more than 140,000 acres in 1950 (HAJDÚ 2006). The naturalization of several other plants totally alien to Hungarian agriculture (e.g. citrus fruits, peanuts or tea) was also an important part of communist economic plans (GYENES 1952; 1954). That introducing subtropical plants to a humid continental country as Hungary was in itself doubtful, did not disturb the main supporters of the project. Instead, massive propaganda campaigns were launched in order to inform the sceptical public about the goals and the “achievements” of socialist agrobiology (HAJDÚ 2006). Science was also mobilized to assist in realizing these ends: at the Academy of Sciences, new committees such as the Agrobiological Committee, the Crop Production Committee and the Lemon Committee were established with the task of substantiating scientifically the grandiose political aims (Ibid. 2006).

Although it was mostly agronomists and biologists who contributed to this work, physical geographers were also involved. Their task was to identify those regions of the country with feasible terrain and climatic conditions. The first issue of the newly-established journal of the Geographical Research Institute of the Hungarian Academy of Sciences (GRI HAS), the *Földrajzi Értesítő*, devoted more than 30 pages to the question of new economic plants. The author, Lajos Gyenes, was a geographer of the “new generation”. At the same time, the subject of Geography in primary and secondary education became an important tool for popularizing the new “socialist methods” in agriculture: national competitions for pupils contained several exercises on the issue (SIMON 1955).

Given such “scientific preparation”, the production of new crops gained a strong impetus in 1950. Regarding the climatic conditions of Hungary, a necessary prerequisite for long-term production would have been to shorten the growing period of the cotton to 40 days. Although agrobiological experiments failed, the hot weather of that year resulted in a relatively good crop yield and so convinced the party leadership about the correctness of their goals. Their new initiative urged doubling of the production area given over to cotton. After some further progress in the also remarkably hot summer of 1951, Hungarian cotton production soon ended in failure. From 1953, as a result of the economic failure and of the changed political contributions given the death of Stalin, the political leadership began to give up its grand schemes on the “transformation of nature” (HAJDÚ 2006), which by then were ignoring issues of physical geography and of profitability. The exception to this was rice, as experiments to increase its production met with significant success. Even though the naturalization and production of this crop had already begun in the interwar period, the communist regime tried to overemphasize its own role in this story (IBID. 2006).

As most Hungarian scientists had never become convinced supporters of the initiative, the years after 1953 also saw expressions of negative opinion. In 1956, József Bognár, the Chief Secretary of the Hungarian Academy of Sciences, strongly criticized the project, and Ferenc Erdei, while evaluating the scientific work of the Academy’s Agricultural Sciences Section in 1957, did not say anything on the issue of new plants (HAJDÚ 2006). Likewise, in geography, supporters of the project

failed to dominate the corresponding discourse. In 1954, the Economic Geographical Session of the Hungarian Geographical Society allowed a lecture by Lajos Gyenes on this issue. The lecture, together with a draft review of the comments coming from the audience, was published in the actual issue of *Földrajzi Értesítő* (GYENES 1954). At the lecture Gyenes, being the strongest advocate of schemes for the naturalization of new plants amongst Hungarian geographers, argued strongly for experimentation with new crops. For him, these crops “serv[ed] the national economy ... and the workers”, so thus experimentation was “expected from us by our working people” (GYENES 1954, 102–103).

The other main participants of the lecture (some as representatives of other disciplines) were not at all convinced. Agricultural scientists underscored that “it is decided by the profitability of the crop’s production” what should be produced (quoted in GYENES 1954, 133). The head of the Geographical Research Group of the Academy, Ferenc Koch, a disciple of Pál Teleki, cautiously referred to the relative ignorance of some physical geographical factors by Gyenes (GYENES 1954). In other words, members of the audience who were involved in interwar academic life criticized Gyenes’s Stalinist type approach.

Marxist-Leninist economic geographers of the Markos school were also present at the lecture. They admitted the failure of the introduction of new crops, especially cotton, but, indirectly, also criticized the critics who emphasized the importance of physical geographical factors. As one of them, Mihály G. Szabó stressed: “It was not so much the physical factors as the social preconditions of large-scale cotton production that were missing” (quoted in GYENES 1954, 136). G. Szabó admitted neither to the crucial role of some physical geographical factors, nor to their poor consideration in related scientific works. Instead, he came to the conclusion that the social preconditions for production should have been better enumerated and evaluated. With this, he still tried to defend the grandiose scientific project of symbolic importance, irrespective to its obvious failure. György Markos himself, however, expressed rather moderate views. Soon, as with the scientific debate, the issue of “new plants” gradually lost its political resonance after the death of Stalin.

Although several Marxist-Leninist geographers actively participated in the politically-motivated planning projects, geography also played a significant role in the propaganda of “constructing socialism”, especially in primary and secondary school education. Pupils were expected to use theoretical knowledge in the solution of practical issues. Geographically relevant questions of economic planning (the naturalization of new plants and the optimal spatial allocation of the forces of production in Hungary) also had a dominant role in the curriculum (KORZSOV 1955; SIMON 1955). At the same time, richly-illustrated books such as *A szovjet nép átalakítja a természetet* (“The Soviet people transform nature”) (ANONYMUS 1951a) or *A sztálini korszak nagy építkezései* (“Large constructions of the Stalinist era”) (ANONYMUS 1951b), each containing Soviet researchers’ articles of popular science in translation, were released to libraries throughout the country.

Literature of popular science was to reveal that “the leading role of science of the Soviet Union is becoming more and more clear” (ANONYMUS 1952, 23). Thus, books on geographical topics were also to inform the masses about the “achievements” of the Communist state and to indoctrinate them with communist

ideology. The same was true for publications reporting on the goals of the economic plans: maps were used for propagandistic reasons. As the foreword of one such book emphasized: “There is nothing more convenient for letting the broad masses know and evaluate the Plan than geographical representation.” (BEREI 1948, 2).

Marxist-Leninist geography thus not only contributed to practical projects, but also was a tool for propagating official ideology. In other words, although official propaganda set the goal of producing factual knowledge for science, all disciplines were expected to produce and disseminate orientation knowledge for propagandistic reasons as well (cf. MEUSBURGER 2005). Geography was no exception: its role was not only to contribute to the realization of large projects, but also to mediate Marxist-Leninist ideology and, thus, to legitimize the ruling order. It functioned as an organic element of the Stalinist “mind industry”, and was aimed at “selling” “the existing order” (ENZENSBERGER 1975, 72).

4 Conclusion

The rapid Sovietization of Hungarian science in general, and geography in particular, occasioned dramatic changes in the latter’s theoretical approach and in the lives of its personnel. The discipline was transformed in line with Marxist-Leninist expectations. The name “human geography” was erased in the new discourse, and its successor was christened “economic geography”. Little room was left for several, formerly flourishing fields of interest: geographical researches concerning politics, religion or ethnicity were banned. Pre-war approaches in urban geography influenced by the French *géographie humaine* and the German *Länderkunde* were not incorporated into the new “economic geography” since they were judged to be infiltrated by environmental determinism. Several topics were blamed for concentrating on the form instead of its essence, a “bourgeois trick” “serving capitalistic interests”: urban morphology was thus affected, and even geomorphology suffered in this way.

After exiling “bourgeois” elements from it, geography was infiltrated by firm scientism, thus, a strong belief in the omnipotence of science. The “new” geography was considered as objective due to its “correct” (Marxist-Leninist) ideological substantiation. At the same time, Marxist-Leninist geography was expected to take practical orientation and to contribute to the “construction of socialism”. In Hungary, the discipline became involved in the problem of urban network planning, large-scale economic planning (through the setting-up of “rayons” or economic regions) and in transforming nature in order to improve agricultural production.

For urban planning, the main goals were the development of new industrial towns in order to stimulate industrialization and to strengthen the working class. Meanwhile, the discipline had to contribute to the “scientific” solution of the issue of scattered farms (tanyas) on the Great Hungarian Plain, which were regarded as conserving “outdated” social structures in the rural countryside and, hence, were subjected to demolition. Economic geography was also involved in identifying “optimal” spatial units of production (rayons) for socialist planning. As a

consequence, in Hungarian geography “the decade of rayonization” began, with the issue being in the focal point of spatial research. Finally, the discipline had to actively contribute to the transformation of nature in order to increase agricultural production. Besides projects that were technically realistic but too grandiose, such as irrigation works and the creation of protective shelterbelts, enormous resources were invested in the naturalization of new crops profoundly incompatible with natural conditions in Hungary (such as cotton, citrus fruits, and tea).

It was also deemed an important task that geography participated in the propaganda of these practical goals, through mass education as well as in literature of popular science. As for science, geography became a mouthpiece of the communist leadership. Its role, therefore, was not only to produce utilizable factual knowledge for practical purpose, but also to take its place in the Marxist-Leninist “mind industry” and to legitimize the ruling order through the manufacturing of orientation knowledge.

In fact, Marxist-Leninist geography of the Stalinist period did not succeed in realizing all its objectives. The planned demolition of scattered farms could not be carried through because of its unrealistic scope. Rayonization turned out to be a dead end in relatively small countries incomparable in size to the Soviet Union. Afforestation and irrigation programs could not be fulfilled totally due to the lack of resources, and, with a few exceptions, the introduction of new crops proved totally impossible, and so this goal was soon given up. Yet, the implications of these initiatives were thorough and consequences proved long-lasting in the discipline’s structure and objectives.

Acknowledgements

We would like to thank our friends, Márton Czirfusz, Zoltán Gyimesi and Énok Oláh for the many inspiring talks that we had writing this paper. We are also grateful to Peter Meusbarger and especially to Charles Withers for their comments, thoughtful criticism and help on the early versions of the manuscript. Róbert Györi appreciates the scholarship of the co-funded International Exchange Programme of the Royal Society of Edinburgh and the Hungarian Academy of Sciences that was taken at the University of Edinburgh. Ferenc Gyuris would like to acknowledge the University of Heidelberg Graduate Academy for the Landesgraduiertenförderung scholarship. This paper was also supported by the János Bolyai Research Scholarship of the Hungarian Academy of Sciences.

References

- ABELLA, M. 1956: Vita a földrajzi tudományok filozófiai problémáiról. In: *Földrajzi Értesítő*, 5, pp. 462–466.
- ABELLA, M. 1961: Ankét a településföldrajz helyzetéről és feladatairól. In: *Földrajzi Értesítő*, 10, pp. 121–127.
- ANONYMUS 1949: A Szovjetunió Kommunista (bolsevik) Pártjának története. Budapest.
- ANONYMUS 1950: Forrón szeretett drága Ioszif Visszarionovics! In: *Sztálin és a szovjet tudomány*. Budapest. pp. 7–8.

- ANONYMUS 1951a: A szovjet nép átalakítja a természetet. Budapest.
- ANONYMUS 1951b: A sztálini korszak nagy építkezései. Budapest.
- ANONYMUS 1952: A Magyar Természettudományi Társulat Zsebkönyve. Budapest.
- ANONYMUS 1954: Vitaülés objektív gazdasági törvényszerűségek feltárásáról. In: Földrajzi Értesítő, 3, pp. 779–783.
- ANONYMUS 1970: Lenin and Science. In: Journal of Mining Science, 6, pp. 129–131.
- BELUSZKY, P. 1982: A szerkesztő vitaindítója – A komplex gazdasági körzet – hit, remény vagy valóság? In: Területi Kutatások, 5, pp. 3–24.
- BELUSZKY, P. 2006: Historische Geographie der Großen Ungarischen Tiefebene. Passau.
- BELUSZKY, P. and T. SIKOS (eds.) 1982: Területi Kutatások, 5. Budapest.
- BEREI, A. 1948: Előszó. In: G. MARKOS (ed.): Magyarország gazdasága és a hároméves terv. Budapest, p. 2.
- BRAIN, S. 2010: The Great Stalin Plan for the transformation of nature. In: Environmental History, 15, pp. 670–700.
- BULLA, B. 1955a: A magyar földrajztudomány útja a felszabadulás után. In: Földrajzi Közlemények, 79, pp. 93–114.
- BULLA, B. 1955b: Válasz Markos Györgynek. In: Földrajzi Közlemények, 3, pp. 367–371.
- CIALDINI, R.B. 2008: Turning persuasion from an art into a science. In: MEUSBURGER, P., M. WELKER and E. WUNDER (eds.): Knowledge and Space, Vol. 1: Clashes of Knowledge. Dordrecht, pp. 199–209.
- DOBROV, A.S. 1952: Az imperializmus védelmének alapvető módszerei a burzsoá gazdasági földrajzban. In: Földrajzi Értesítő, 1, pp. 1–32.
- ENGELS, F. 1991: Preface. Capital, Vol. 3: A Critique of Political Economy. London, pp. 91–111.
- ENYEDI, G. 1961: Vita a gazdasági rayonkutatás elméleti és módszertani kérdéseiről. In: Földrajzi Értesítő, 10, pp. 117–121.
- ENYEDI, G. 1982: Temetés vagy a tetszhalott ébresztése. In: Területi Kutatások, 5, pp. 52–54.
- ENZENSBERGER, H.M. 1975: The industrialization of the mind. In: Urban Review, 8, pp. 68–75.
- ERDEI, F. 1939: Magyar város. Budapest.
- ERDEI, F. 1941: A tanyás települések földrajzi szemlélete. In: Földrajzi Közlemények, 69, pp. 103–113.
- GERŐ, E. 1950a: A Magyar Tudományos Tanács feladatairól. In: Gerő, E. (ed.): Harcban a szocialista népgazdaságért, Válogatott beszédek és cikkek 1944–1950. Budapest, pp. 341–354.
- GERŐ, E. 1950b: Az ötéves tervvel a szocializmus felé. (Beszéd az Országgyűlésben, 1949. december 9-én). In: GERŐ, E. (ed.): Harcban a szocialista népgazdaságért, Válogatott beszédek és cikkek 1944–1950. Budapest, pp. 554–592.
- GEROVITCH, S. 2001: Soviet computing, American cybernetics and ideological disputes in the early 1950s. In: Social Studies of Science, 31, pp. 253–287.
- GYENES, L. 1952: A citrusfélék hazai termelésének gazdaságföldrajzi vonatkozásai. (Beszámoló az MTA Állandó Földrajzi Bizottsága által 1952. március 7-én rendezett szakülésről). In: Földrajzi Értesítő, 1, pp. 85–118.
- GYENES, L. 1954: Új gazdasági növényeink. In: Földrajzi Értesítő, 3, pp. 101–138.
- GYÓRI, R. 2001: A magyar gazdaságföldrajz a két világháború között. In: NEMES NAGY, J. (ed.): Geográfia az ezredfordulón. Budapest, pp. 61–83.
- GYÓRI, R. 2009: Tibor Mendöl. In: LORIMER, H. and C.W.J. WITHERS (eds.): Geographers. London, pp. 39–54 (= Biobibliographical Studies, vol. 28).
- GYÓRI, R. and F. GYURIS 2012: The Sovietisation of Hungarian geography, 1945–1960. In: Mitteilungen der Österreichischen Geographischen Gesellschaft, 154, S. 107–128.

- HAJDÚ, Z. 1990/91: A Tanyai Tanács története (A “szocialista tanyapolitika” alapvetése és a tanyakérdés megoldásának radikális, voluntarisztikus kísérlete, 1949–1954). In: *Alföldi Tanulmányok*, 14, pp. 105–124.
- HAJDÚ, Z. 1992: Település- és településhálózat-fejlesztési politika Magyarországon az államszocializmus időszakában. In: *Földrajzi Közlemények*, 116, pp. 29–37.
- HAJDÚ, Z. 2006: A szocialista természetátalakítás kérdései Magyarországon, 1948–1956. In: KISS, A., G. MEZŐSI and Z. SÜMEGHY (eds.): *Táj, környezet és társadalom: ünnepi tanulmányok Keveiné Bárány Ilona professzor asszony tiszteletére*. Szeged, pp. 245–257.
- HORVÁTH, G. (ed.) 2008: *Regionális fejlődés és politika az átalakuló Oroszországban*. Pécs.
- IVANOV, K. 2002: Science after Stalin: forging a new image of Soviet science. In: *Science in Context*, 15, pp. 317–338.
- KOLTA, J. 1954: A gazdaságföldrajzi rayonírozás néhány elméleti kérdése és adatok Baranya megye rayonbeosztásához. In: *Földrajzi Közlemények*, 2, pp. 199–219.
- KORZSOV, N. I. 1955: Gazdasági földrajzi kirándulások a középiskolában. In: *Földrajzi Közlemények*, 3, pp. 51–61.
- KRAJKÓ, G. 1982: A gazdasági körzetek néhány fontosabb vonása. In: *Területi Kutatások*, 5, pp. 25–41.
- KREMENTSOV, N. 1996: A “Second Front” in Soviet genetics. The international dimension of the Lysenko controversy, 1944–1947. In: *Journal of the History of Biology*, 29, pp. 229–250.
- MARKOS, G. 1952a: Magyarország gazdasági körzetbeosztása. A Magyar Tudományos Akadémia Állandó Földrajzi Bizottságának 1952. június 13-án rendezett vitaindító előadása. In: *Földrajzi Értesítő*, 1, pp. 582–634.
- MARKOS, G. 1952b: A természeti földrajzi környezet hatása különböző társadalmi formák között. In: *Földrajzi Értesítő*, 1, pp. 271–287.
- MARKOS, G. 1955: Reflexiók egy beszámolóhoz. (A földrajzi tudományok módszertani alapjairól). In: *Földrajzi Közlemények*, 79, pp. 359–365.
- MENDŐL, T. 1939: Néhány szó az alföldi város kérdéséhez. In: *Földrajzi Közlemények*, 67, pp. 217–232.
- MENDŐL, T. 1941: Falu és város a magyar tájban. In: ECKHARDT, S. (ed.): *Úr és paraszt a magyar élet egységében*. Budapest, pp. 81–105.
- MERCER, D. 1984: Unmasking technocratic geography. In: BILLINGE, M., D. GREGORY and R. MARTIN (eds.): *Recollections of a Revolution: Geography as Spatial Science*. London, pp. 153–191.
- MEUSBURGER, P. 2005: Sachwissen und Orientierungswissen als Machtinstrument und Konfliktfeld. Zur Bedeutung von Worten, Bildern und Orten bei der Manipulation des Wissens. In: *Geographische Zeitschrift*, 93, pp. 148–164.
- MITTELSTRAß, J. 2001: *Wissen und Grenzen*. Frankfurt am Main.
- NAGEL, T. 1986: *The View from Nowhere*. Oxford.
- OLGIN, M.J. 1935: *Trotskyism: Counter-revolution in Disguise*. New York.
- POLLOCK, E. 2006: *Stalin and the Soviet Science Wars*. Princeton, N.J., Oxford.
- RADÓ, S. 1962: A kommunizmus építése és a földrajzi tudományok. In: *Földrajzi Közlemények*, 86, pp. 225–232.
- RÁKOSI, M. 1951: Május 15-én egy emberként a népfront mellé! (A Népfront választási gyűlésén, Celdömölkön, 1949. május 8-án mondott beszéd). In: RÁKOSI, M. (ed.): *A békéért és a szocializmus építéséért*. Budapest, pp. 5–28.
- SIMON, L. 1955: Földrajzoktatásunk néhány alapkérdése a “Rákosi Mátyás” tanulmányi verseny eredményeinek tükrében. In: *Földrajzi Közlemények*, 3, pp. 157–166.
- SPRIANO, P. 1985: *Stalin and the European Communists*. London.
- STENMARK, M. 2008: Science and the limits of knowledge. In: MEUSBURGER, P., M. WELKER and E. WUNDER (eds.): *Knowledge and Space, Vol. 1: Clashes of Knowledge*. Dordrecht, pp. 111–120.

- TELEKI, P. 1922: Térkép és statisztika a gazdasági földrajzban. In: Földrajzi Közlemények, 50, pp. 74–91.
- TOPCSJEV, A. V. 1950: Sztálin elvtárs a tudomány és gyakorlat egységéről. In: Sztálin és a szovjet tudomány. Budapest, pp. 263–284.
- VAVILOV, S.I. 1950: A sztálini korszak tudománya. Budapest.
- WUNDER, E. 2008: Introduction to this volume. Clashes of knowledge inside, outside and at the threshold of science. In: MEUSBURGER, P., M. WELKER and E. WUNDER (eds.): Knowledge and Space, Vol. 1: Clashes of Knowledge. Dordrecht, pp. 5–9.