Social Evolution: Theoretical Aspects and General Outlines

Leonid Grinin
HSE University; Institute of Oriental Studies, Russian Academy of Sciences, Moscow

Andrey Korotayev
Russian Presidential Academy of National Economy and Public Administration, Moscow, Russia; Institute of Oriental Studies, Russian Academy of Sciences, and HSE University, Moscow

ABSTRACT

The present article is devoted to social evolution both as a part of macroevolution and as a specific process that have led humanity to outstanding successes and heights (while creating in the meantime serious crises and major problems). The article examines important theoretical aspects of social evolution within the framework of a more general approach, which we call evolutionary studies. The authors give a definition of social evolution, examine its most important mechanisms, compare it with biological evolution, introduce the concept of social aromorphosis, and analyse the concept of unilinear and multilinear evolution. We show that only by considering the evolution as multilinear one can identify the major trends and patterns of social evolution and evolution in general. The authors view social evolution both as changes in a relatively local and not so long-term perspective and as a larger process that we call social macroevolution. In our understanding, social macroevolution is a special dimension of social

Recommended citation: Grinin, L. E., Korotayev, A. V. Social Evolution: Theoretical Aspects and General Outlines. *Social Evolution & History*, Vol. 22 No. 2, September 2023, pp. 111–158. DOI: 10.30884/seh/2023.02.07.

evolution that encompasses a series of the most important and milestone transformations that have led to the emergence and development of the World System (and, accordingly, a theory that focuses on their analysis). The genesis of the World System and a number of its further changes are the key elements of the social macro-evolutionary process. Moreover, the emergence of the World System was not only the most important result of the entire previous course of social evolution, but also became, in a certain sense, the threshold beyond which it is absolutely necessary to distinguish social macroevolution as a special supra-social part of social evolution (i.e., the part that no longer relates to the level of only individual society). The main trends of macroevolution, such as the irreversibility of evolution, its particular direction, variability, are expressed both in the systemic features and in the transformations of the World System. The article was prepared as a part of the research work of the state task of the RANEPA.

Keywords: *evolution, macroevolution, social evolution, cultural evolution, biological evolution, reorganization, aromorphoses, social aromorphoses, society, natural environment, social environment.*

1. SOCIAL EVOLUTION AND AROMORPHOSES

1.1. On the Definition of Social Evolution

Social evolution is a category whose definition provokes endless disputes. The matter is that ‘evolution’ (as well as ‘progress’, ‘development’, ‘change’, *etc*.) is among the terms with a too broad meaning. Nevertheless, let us try to define social evolution on the basis of the general definition of evolution (see this definition Grinin L. and Grinin A. 2020: 23–24). Let us recall that we mean evolution as opposed to devolution, that is, to a process of regression and degradation that generally worsens the capabilities of systems, their adaptive qualities, their diversity, *etc*. In addition, we are primarily interested in progressive evolution, and not in transformations, which are lateral.

One can define social evolution as *the process of changes in time of forms, structures, functions, properties, social objects, systems, subsystems, natural groups and complexes of different size of systems, subsystems and objects, up to the formation of the most complex systems (the World System, humanity), as well as of the forms of relations between social systems and groups. Due to this process there emerge qualitative changes in comparison with the previous state (and also*

the ability to accumulate such changes, including their purposeful usage and training in activities that lead to such changes). At the same time, the overall balance of such changes should be generally positive appearing directly or in a more distant period. The positive balance can be manifested in relation to individual systems (objects) and/or to their narrow or wide set up to the marginal systems.

Thus, here we see the possibility of a deeper understanding of evolution and the conscious use of the mechanisms of such changes. This radically distinguishes social evolution from other types of evolution. It is a reminder that in the course of evolution both positive and negative changes are realized and social evolution is less additive than biological and cosmic evolution (see below). But the overall balance of changes is important – if it is positive, then we are talking about evolution; if it is negative – about devolution or involution.[1]

1.2. Social and Suprasocial Social Evolution and Some of Its Mechanisms (Challenges, Aromorphoses, *etc*.)

1.2.1. Social Aromorphoses

There is a very productive concept in evolutionary biology namely the *aromorphosis theory*. The basis of aromorphosis is usually formed by 'a particular acquisition, which... leads to great advantages for the organism, provides it with favourable conditions for reproduction, increases its number and its variability... and thus, accelerates the pace of its further evolution. Under these favourable conditions, a complete restructuring of the entire organization then takes place' (Schmalhausen 1969: 410; see also Severtsov A. S. 1987: 64–76). And then, in the course of adaptive radiation, these changes in organization spread more or less widely, sometimes with considerable variations. We develop these ideas with respect to social evolution, introducing the term social aromorphosis.

Social aromorphosis can be roughly defined as a universal (widespread) change (innovation) in the development of social organisms and their systems, which increases the complexity, adaptability, integration and mutual influence of societies (see Grinin, Korotayev 2007b, 2008, 2009a; Grinin, Markov, Korotayev 2008, 2013, 2020; Grinin 2017).

As a result of social aromorphoses:

a) the level of complexity of societies increases as well as the opportunities for them to expand (change) the natural and social envi-

ronment in which they exist and function (which is manifested, *e.g.*, in the population and/or production growth); the degree of stability of societies in relation to environmental influences also increases;

b) the speed of developmental changes that do not destroy the social system, including the speed of borrowing, increases;

c) the degree of integration of societies increases, special stable super-systems (*e.g.*, civilizations, economic and military alliances) and supra-social zones, centers and special supra-social spheres, which do not belong to any single society, emerge;

d) the pace of evolution increases towards the creation of super-complex ultimate super-systems (world-systems, humanity), within which each social system, while remaining autonomous, becomes part of such a super-large system and develops within its framework through specialization and a special intra-systemic division of functions.

Biological and social aromorphoses are realized through a common evolutionary algorithm and the criteria for both types of aromorphosis also have important similarities. As we said above, the basis of aromorphosis is usually formed by 'a particular acquisition, which... leads to great advantages for the organism' (Schmalhausen 1969: 410; see also Severtsov A. S. 1987: 64–76) or social organism. As a result, the organization of organism or social organism change radically and then those innovations diffuse more or less widely, sometimes with considerable variations.

Take, for example, the invention of iron. As is known, iron smelting was carried out occasionally as early as the 3rd millennium BC, but the production of low-grade steel actually began somewhere in the middle of the 2nd millennium BC, probably in Asia Minor (see, *e.g.*, Chubarov 1991: 109; Wells 2011). Iron metallurgy became particularly widespread in the Hittite state which protected its monopoly. With the destruction of the Hittite Empire, this monopoly was lost and the iron metallurgy began spreading throughout the Afroeurasian world-system. The diffusion of the iron industry led to revolutionary changes in various spheres of life: the ploughing improved, and with it the entire agricultural system (see Grinin, Korotayev 2006); craft industries developed intensively; civilizations replaced barbarian societies; armies of a new type were formed, that is, massive troops, armed with relatively cheap but effective iron weapons; in order to maintain these armies, fundamentally more developed tax systems arose, and therefore, systems for collecting and processing information, *etc*.

As for the differences between social and biological aromorphoses, they stem from the general difference between biological and social macroevolution.[2] The development of a biological aromorphosis leads to an increase in biological diversity, the development of a social aromorphosis leads to the replacement of simple forms by more complex ones.

Using the concepts of social and biological aromorphoses, we managed to derive a number of rules common to biological and social macroevolution, namely: 'payment for arogenic progress,' 'special conditions for the emergence of aromorphoses' and others that can be considered similar (in general terms) and work well in both biological and social phases of macroevolution (for details see Grinin, Markov, Korotayev 2008, 2009, 2013, 2014, 2020; Grinin 2017).

1.2.2. On Some Misconceptions of Social Evolution. Unprecedented Challenges as a Starting Point for Innovation

We believe it is necessary to reconsider a number of views about the very course of social evolution in general. And it is particularly important to abandon the idea that the transition to a new quality is a process of transformations that are mainly predetermined by previous development and that lie 'within' societies, similar to the successive stages of ontogenesis (*i.e.*, under normal conditions leading to the transformation of an embryo into an adult on the basis of the unfolding genetic code). After all, any genetic code (unless it has undergone a significant mutation) ensures development only according to already known patterns that have been tested thousands of times. Moreover, it prevents any changes, especially those that are qualitatively new; after all, its purpose is to prevent deviations from the programme. It is well known that genetic mutations usually occur when external conditions deviate from the norm, and the vast majority of them are neutral or harmful. Therefore, we called the development of social systems along the trajectories set by their 'cultural-genetic code' as *non-evolutionary* development (see below).

In its most retrospectively important part, the evolutionary development is the *advancement of social organisms towards the acquisition of a new, previously unknown aromorphic quality, always associated with the emergence of 'novelty'*. The latter is often associated with the emergence of new problems which, to one degree or another, are exceptional challenges (for a given society, the World System or

humanity in general), such as a sharp increase in population to an unprecedented levels, an acute shortage of land, the emergence of dangerous enemies, split and civil wars in previously peaceful societies, sharp social stratification, unprecedented environmental degradation, etc. And here it is worth paying attention to the huge role of external factors in these problems or challenges. Unfortunately, this aspect of the problem is still underestimated in both Russian and foreign science. For example, there is a common tendency to downplay the role of wars and conquests in the process of statehood development. Thus, according to Henri J. M. Claessen, wars and conquests played a less important role in the process of state formation than ideology or social stratification (Claessen 1989, 2000, 2002).

In general, in the attempts to discover the unchangeable laws of history, Marxism and a number of other schools significantly downplay the role of external factors in the development of society (for details see Grinin 2018b; Grinin and Grinin 2023). In particular, historical materialism predominantly tends to present society as a largely endogenous system which is not much affected by external challenges and exogenous influences. From here came ideas about the driving forces of social development as a kind of built-in force that unfolds independently of everything, almost like the absolute spirit in Hegel (Grinin 2018b; Grinin and Grinin 2023). It is not surprising that Soviet science was characterized by the principle of the priority of internal processes over external ones. Thus, Leonid Kubbel believed that it was necessary to defend 'the idea of the decisive influence of internal factors in the process of formation of a class state' (Kubbel 1988: 214, 230).[3] Even consistent critics of the Soviet legacy in Russian social science believe that only 'internal metamorphoses of primitive societies' are naturally determined processes, while inter-tribal conflicts and wars, though they were widespread in practice, should be regarded as sporadic (Khotzey 2000: 42).[4]

However, new challenges alone are clearly not enough to bring about serious changes. The fact is that most societies 'respond' to new problems with old, familiar, tried and tested means, since they choose not from hypothetical, but from available alternatives (Van Parijs 1981: 51), that is, they use not potentially possible, but actually known measures (Claessen 1989). Of course, such 'answers' are not always effective. As a result, many societies perish, disappear, and lose their independence.

For example, after the Roman troops left Britain in 410 AD, the Britons (Romanized British Celts), in search of defenders against the raids of the Irish and Scottish barbarians, invited the Saxons and gave them land, thus implementing a certain social innovation, but one that had already been tried repeatedly in the Roman world with its practice of 'using one barbarian tribe to help fight another.' But the Saxons, seeing the weakness of the British, soon ceased to obey the local authorities and, in the end, became masters of the land along with the Angles and Jutes. And the Britons, despite long and stubborn resistance, were partly expelled, and partly killed or enslaved. Thus, instead of a 'British' state, barbarian Anglo-Saxon kingdoms emerged in Britain (Blair 1966: 149–168; Chadwick 1987: 71; Filippov 1990: 77; Melnikova 1987: 8–11).

However, sometimes social organisms are forced to respond in genuinely new ways; sometimes this happens against their will. Of course, such new responses are not always rational, effective and successful. After all, the path to an effective new one is an unknown, unfamiliar, and at random. This means that mistakes, including irreparable ones, are inevitable. *This is why societies so often perish or decline throughout history. Therefore, the emergence of a new, evolutionarily promising model always requires a combination of peculiar, somewhat exceptional conditions, a unique coincidence of external and internal factors, that is, new challenges and new successful responses to them* (for more details see Grinin 1997a, 1997b, 1997c, 2003a: 52–53; 2003b: 48–52; 2007a, 1: 7–10, 56–60). 'The evolutionary theory emphasizes this rather incredible tendency – to take up random opportunities – towards structural changes, which, from the point of view of the whole, transform these incredible impulses into probabilities by embedding them in systems, in order to preserve and ordering of these opportunities' (Luhmann 2000: 92–93).

On the whole, *in general historical terms, only a small minority of responses to challenges were able to become a source of systemic aromorphoses*. This means that most societies were unable to move to a new qualitative level: either they lacked the necessary potential, or there were some 'errors' in their organization, or the system was too rigid to be easily transformed, or conditions were required that did not exist, or it could also happen for other reasons. Meanwhile, it is no coincidence that social development is often considered as central to social evolution (White 1949; Steward 1972 [1955]).

1.2.3. Levels of Evolution and Its Features at Different Levels

Unfortunately, evolutionists and even neo-evolutionists consider evolution mainly at the level of individual societies, social organisms, and 'such an understanding completely removes the distinction between ... the natural-historical process and its concrete-historical manifestation, between the general direction of development and the form of its manifestations' (Girenko 1991: 23). As a result, they face seemingly insoluble problems. They face a constant problem: how to fit the idioadaptation, degeneration, stagnation, decay, and other processes into evolution; how to explain the cyclical dynamics? After all, the development of almost every society passes through alternating periods of prosperity and decline.

Undoubtedly, we will get a more realistic picture of social evolution if we try to consider 'decline'/degeneration, stagnation and even decay as characteristic aspects of evolution (Yoffee 1979), as has long been done with respect to biological evolution (Severtsov 1939, 1967). But this is still not enough to adequately understand social development which is the most important component of social macroevolution. Such an adequate understanding is possible if we consider evolution not only at the level of individual societies, but also at a higher (suprasocietal) level, and identify the more and the less promising variants of its development (including the arogenic one, *i.e.*, a sequence of innovative breakthroughs). Hence, it is inevitable to recognize that societies develop in different ways, that the transition to a new society is realized within a spectrum of different options, at one end of which there is the emergence of a promising aromorphic model of development in the future, and at the other – the emergence of a totally unpromising, unviable model, which ultimately leads society into an evolutionary dead end in the future, from which independent and successful movement is impossible or extremely difficult. Moreover, for most of human history, it was precisely this lack of prospects for some societies that contributed significantly to the prospects of the ultimately 'successful' model. This is the rule of payment for aromorphic progress (Grinin and Korotayev 2008, 2009; Grinin, Korotayev, and Markov 2011, 2020; Grinin 2017; for details see below).

But if societies actually develop in different directions and models, how can be these qualitative changes described if one works at the level of the development of individual societies, rather than their totality (or the whole historical process or its main stage)? In this case,

evolutionary theorists naturally face serious methodological difficulties, in particular, how to fit completely different directions of development into one or two evolutionary models, when qualitative reorganization should be observed everywhere.

Then comes the difficulty of choosing the scale of the study. The level at which evolution is considered (episode, individual society, region or World System) depends, of course, on the research task. If we take, say, the level of the world historical process, then we must clearly understand that we will consider far from all the changes. Moreover, we are determined not to analyze all qualitative changes (or qualitative reorganizations). The point is that here it is necessary to consider, first of all, qualitative changes of a peculiar kind and particular importance (which we have designated as social aromorphoses of higher levels).

There can be distinguished different types of social aromorphoses; some of them lead to less important (or less widespread) qualitative changes; others – to more significant qualitative changes (*e.g*., to the emergence of a new level of integration/governance in society). But in addition, there are also aromorphoses of particular importance, whose appearance creates the opportunity for the emergence of *evolutionary 'breakthrough'*[5] *qualitative changes that gradually become universal*.

Examples of social aromorphoses of the highest type include:

- ideological understanding of the kinship and property systems, which created a universally convenient system of social structuring;
- the transition foraging to food production, which gave a powerful artificial increase in the volume of biomass useful to humans, as well as the targeted use of animal power;
- the emergence of writing, which became the basis for the information revolution, the emergence of developed administrative systems, written literature, and science;
- the transition to iron metallurgy;
- the emergence of developed market systems, which laid the foundations for the industrial revolution;
- the emergence of computer technology, *etc*.

Each of these social aromorphoses had a number of different and usually very important consequences, generally contributing to increasing capacity of societies to be sustainable or expanding the capacity of the environment they use.

These three types of development are interrelated, but they are types of development of different importance; however, there is often a lack of understanding of the fundamental difference between them. In order to emphasize this difference, we propose to use the term ***social macroevolution*** *to designate the level of social evolution which is characterized by social aromorphoses of the highest type (i.e., those important for the actual levels no smaller than civilizational and regional ones). As a result of such aromorphoses, there is a transition to a new stage of development in many societies, in the World System or, in relation to the most recent times (when the World System involves all of humanity), in humanity as a whole.*

Thus, qualitative breakthroughs (macroevolutionary aromorphoses) of the third type, which determine the further development of a large number of societies, are a special type of qualitative changes. And therefore, they should not be confused with any kind of qualitative reorganization, especially since such changes are extremely rare. Diversification almost always occurs at all levels, while upward movement is extremely rare, notes Tim Ingold (1986). Aromorphoses (both biological and social) are observed even less frequently. Moreover, as shown above, while such aromorphoses may initially appear in one or a few societies, they are in fact the result of the development of many societies. And this dialectic of the combination of the universal and the particular in them is very important to take into account.[6]

As we understand it, the scheme of the evolutionary mechanism of such aromorphosis is as follows. These rare and important innovations emerge in individual societies and are to a large extent, the result of internal factors. But they are the result of a peculiar combination of circumstances, because such societies, which are particularly important in evolutionary terms, must first collect, implement, accumulate the achievements of many societies (as a result of many processes and coincidences), and only then these societies can creatively rework them under a favorable combination of circumstances, including a successful external environment. All this means that the role of the external environment in the emergence of social aromorphosis is always great and sometimes extraordinarily great. But the very emergence of arogenic innovation is actually only the beginning of the process of formation of aromorphosis. The point is that this new quality appears in a place ‘chosen’ by evolution, but it cannot become estab-

lished without spreading to other societies, which sometimes takes a very long time (we called the phenomenon of a long delay in the spread of aromorphoses the *rule of delayed aromorphosis* [Grinin, Markov, Korotayev 2008, 2020]). The main reason for this phenomenon is that the diffusion of aromorphosis requires a certain impact of pioneer societies on others (in the form of conquest or other coercion; or, on the contrary, the advanced society itself is conquered and the conquerors assimilate these achievements; or in the form of exchange, distribution by migrating people, evidence of competitive advantages, *etc.*). Here one should pay attention to the following important feature. Since *the diffusion of the given aromorphic achievement occurs through the influence of the society that created this innovation, so this transient innovation no longer appears to other societies as an internal factor, but as an external one*. And as a result, the degree of internal readiness of the borrowing societies, as well as the degree of favorable conditions for borrowing, determines the degree of independence of such a transition, and accordingly, the model of transformation, which can be, for example: a) catching-up; b) modernization; c) direct imposition (military, colonization, *etc.*); d) direct copying; e) borrowing under conditions of specialization of the society. As a result, different models of development emerge, which already differ significantly from the primary one. We can also conclude that the *more widespread a new model becomes, the easier it becomes, on the one hand, to adopt it, and on the other hand, the less exclusive the combination of conditions it requires*. In the end, the corresponding aromorphic institutions are simply borrowed in a ready-made form.[7]

In relation to the state, many researchers emphasize the differences by introducing the concepts of so-called primary and secondary states (*i.e.*, states that emerge without the influence of other states, and states that emerge under the influence of ready-made patterns and under the influence of existing states). However, at the level of evolutionary theory as a whole, such approaches cannot make their way for some reason. Hence the ideas prevail that in every society there can, or even should, be evolutionary changes not just of one order, but evolutionary changes of a single set of characteristics, and that even details, that are not particularly important in evolutionary terms, should be consistent. In fact, evolutionary changes of the aromorphic scale cannot generally be the same in all societies.

2. SOCIAL EVOLUTION AS A DEVELOPMENT AT THE SUPRESOCIETAL AND WORLD-SYSTEM LEVELS

2.1. The Relationship between Social and Suprasocial (World-System, Universal) Evolution

A major methodological error, characteristic of classical evolutionism, according to which all societies develop in the same way, passing through the same stages of development, is also characteristic of some modern views. But this is wrong for a number of reasons. In particular, since societies exist in a supersystem of the external environment (and the later the era, the larger this supersystem is), then it develops its own laws of development. According to them, there appears: a) a division of labor or functions within the international system; b) exploitation of some societies by others; c) own superstructure, in which central and peripheral elements can be distinguished. Respectively, due to the division of functions, external exploitation and different positions in the supersystem, they specialize and develop along different trajectories, while the general development is characteristic only of the supersystem as a whole, but at the same time its central societies turn out to be closer to the general development pattern than the peripheral ones (Grinin 2018b; 2019a).

The mechanisms of social evolution are often presented as being of the same type both in the change of an individual society over a short period of time, and in the global transformations of world systems and the whole humanity over vast periods of time. This is a general drawback of views on complex processes in the social sciences, and, it is from such positions that they often try to analyze social laws, the driving forces of the historical process, progress, *etc*. Many social scientists implicitly mean by such an analysis that if we recognize the action of a factor as leading, then it must be everywhere, always, in every episode, in every cell of society. The result is absurdity.

This approach is a disguised idea that evolutionary laws must apply to all social organisms and that the main change takes place precisely at the level of organisms.[8] But this is not so. And with regard to the most important, critical changes, this is completely wrong. Therefore, ‘the ambitious assertion that every nation must pass through a stage represented in our history before reaching this or that point can no longer be maintained’ (Lowie 1920: 441). Many years ago, Theodor Schieder noted with bitterness that the evolutionary scheme, ac-

cording to which all peoples and cultures pass through the same stages of development, originated in the eighteenth century, but, although it has been disproved by the results of research, it still has an enormous impact in some disciplines, such as ethnography, and it is extremely difficult to eliminate it (Schieder 1965). The fact that such ideas were expressed many decades ago, while the issue is still relevant, shows how slowly some problems in social science can be solved (because of the neglect of important theoretical issues).

Some researchers have tried to avoid these shortcomings. For example, one of the most perceptive minds of the time, Henri Claessen suggested a definition of evolution as a *process of structural reorganization over time*. To understand evolution, Claessen considers it important to emphasize that the process of transformation from simple to complex is not the essence of cultural evolution, as Spencer believed (Claessen 1989: 234; 2000: 1, 7), since it is observed far from always and everywhere. There is much truth in this approach, and that is why, as emphasized above, we generally accept the Voget-Claessen definition (Voget 1975: 862). But it is precisely for this reason that it is worth dwelling in more detail (now at the level of social evolution itself) at what are the important, unresolved and, it would seem, even unconscious shortcomings of common evolutionary views, which, unfortunately, even such outstanding researchers as Claessen could not avoid.

To this end, let us point to the undeniable fact that every major qualitative social transformation at the highest systemic level – *i.e.* at the universal human level, the World System, or at least at the level of its major part – has very often taken place through the degeneration or destruction of a number of social systems, through their integration, as well as through the development of different societies in different directions, of which only some then became the leading ones. At the same time, a significant part of the achievements of societies that did not develop along the conventionally identified leading line of evolution are nevertheless used. This entire complex process of accumulation, selection and synthesis ultimately creates the conditions for a qualitative breakthrough (aromorphosis). In other words, the development of humanity, on the one hand, and of certain specific societies, on the other, is not a correlation of the same processes merely occurring at different scales. Therefore, it is more productive to consider them as the relationship between parts and the whole. And as we know, the whole is not equal to the sum of its parts. This is evident,

since the constituent parts perform multiple functional roles, including center and periphery, predator and prey, winner and loser, borrower (recipient) and giver (donor), colony and metropolis, supplier and consumer of resources, producer and intermediary, manager and performer; as well as organs that specialize in individual functions and simple participants in the division of labor, *etc*.

2.2. Evolution and Payment for Arogenic Progress

So, in our opinion, macroevolution should be primarily considered at the suprasocietal level, that is, as a result of competition, selection, destruction, and decline of certain social systems alongside the rise of others; it also entails the emergence (as a result of integration, unification, and subordination) of a new generation of societies possessing novel and unique characteristics. In other words, for most of human history, the aromorphic evolution of some societies could not have occurred without destruction, absorption, degradation, stagnation, lag, and dead-end development of other societies; and, in general, social evolution would not have followed its actually observed pattern. This is the essence of the rule of payment for aromorphic progress.

Therefore, evolution at the level of the world-historical process, that is, macroevolution, is always the result of the interaction between different developmental lines, as well as idioadaptation, specialization, decline and degeneration, parasitism, destruction, and other processes, and cannot be extended to individual societies without special techniques.

So, it is evident that the still common view that all societies and peoples follow the same developmental stages, is fundamentally incorrect. Figuratively speaking, evolution *is not a wide staircase* which sooner or later everyone can climb in one direction and independently, but it may be compared with a *very complex labyrinth*, where few can navigate without borrowing (and even then only at a certain stage; and anyway, no society has been able to find its 'way out of this labyrinth' without borrowing). In other words, *far from all individual societies reproduce the general evolutionary development on a small scale, but only some of them, and only during certain periods of macroevolution (and then with major reservations)*. **The matter is that until very recently, an evolutionary breakthrough to a qualitatively new level (aromorphosis) in one place (society) could only occur at the expense of death, stagnation, lateral movement, etc. of numerous other societies**.

This can be proved by the example of the formation of a state. It took millennia for the evolutionary advantages of this new form to become apparent and for it to become dominant. However, during this process, tens of thousands of political organisms disappeared as independent entities, forever losing the opportunity to become independent.

For example, why did not the Gauls have a state organization, despite their noticeable superiority in terms of culture, population, development of cities and trade over many others, for example, the Saxons and Angles, who conquered Britain? (about the very high level of development of pre-Roman Gaul, see, *e.g.*, Clark, Piggott 1970: 310–328; Chadwick 1987; Bessmertny 1972; Braudel 2009; Shkunaev 1989; Shtaerman 1951; Filip 1962: 116–129; Mongait 1974: 248–253; Le Roux 1961; Thévenot 1960).

Let us consider a closer analogy. Was the unification of small, ethnically similar polities (such as principalities, duchies, city republics, etc.) into large centralized states inevitable during the late Middle Ages and the Early Modern Period (15^{th} – 18^{th} centuries) within the framework of the World System? Undoubtedly, it was. However, such states did not emerge in Italy and the western part of Germany in that period. And they would rise much later under a strong external influence. And in Poland, for example, a strong royal power was never established. Many countries have diverged from the seemingly inevitable (in the context of the general evolution of the World System in the 19^{th} – 20^{th} centuries) development towards democracy and reinforcement of private property. Even today, the process of globalization sharply divides countries and peoples into those who will play a significant role in the new globalized world, and those being primarily subject to change (at least in the next decades).

Thus, although it is quite correct to consider the state as an inevitable outcome of evolution, this assertion may be applied only in the most general sense, when talking about the state as a product of a long-term competition among various forms, their disappearance, transformations, and social selection, etc. In other words, this generally applies to humanity. Meanwhile, *the emergence of the state was not inevitable for every individual society.*

After all, the state was not only a completely new solution to the problems that increasingly complex societies faced, but also a path that meant a break with many earlier relationships and traditions (Henri Claessen dedicated many works to the analysis of this process; see, *e.g.*, only his last works Claessen 2002, 2010, 2018; about Claessen's

studies in early state see also articles of Gary M. Feinman and Michał Tymowski in this volume). But implementing it can be quite difficult and simply not always feasible. Therefore, many societies pursued their own path, but this often resulted in different outcomes, in particular to the overdevelopment of previous trends (see, *e.g.* Grinin 2003c; 2004; 2007a, book 2; 2007d; 2020b; Grinin, Korotayev 2007c) or to the creation of fundamentally new forms of complex political organization, qualitatively differing from state systems (see, *e.g.* Korotayev 1997, 2000a, 2000b, 2020a, 2021; Korotayev, Kradin *et al.* 2000). Such a development could lead, for example, to over-sacralization of the ruler, the over-complexity of family ties and emergence of an aristocratic class of privileged families and family lines, to the complication of network horizontal (rather than vertical hierarchical) connections, to the rigid consolidation of professional and social differences (caste system); to the establishment of confederations of tribes, civil communities or cities without a strong central authority (but with effective alternative mechanisms for intersocietal integration), or other models (Korotayev, Kradin *et al.* 2000). At the same time, the direction of development is always influenced by various specific historical reasons (for details see Grinin 2003c, 2007a, 2020b).

The destiny of an individual society is often determined by chance, especially in times of instability and bifurcations. In particular, the emergence of states and other complex political systems often created such a bifurcation zone for many evolving societies, wherein seemingly unimportant events could play a decisive or even pivotal role. For instance, prior to being proclaimed as Supreme Khan, Genghis Khan miraculously escaped death three times; and once he was even pursued by three hundred horsemen who were searching for him (Khara-Davan 1996: 105). Had he perished, the gigantic empire would not have arisen. After all, the history of nomads demonstrates that sometimes centuries may pass until a figure appeared who could unite them to such an extent. And the Mongol Empire should be considered as an exceptional case (Barfield 1991: 48). During the early modern period, bifurcation states especially frequently emerged during revolutions, when the role of individuals and associated circumstances drastically increased (for details see Borodkin 2007; Grinin 1997b: 37–59; 2003b: 75–85; 2007b: 185–200; Korotayev 2004; about the role of individual in history and social evolution see Semyonov, Gobozov, and Grinin 2007; Grinin 2008, 2009, 2010, 2012).

Thus, on the one hand, every evolutionary leap is prepared by previous development and experience of failed attempts at finding a new path, as well as by a growing need to find 'a solution to the problem,' this continues until the line of evolution reaches the optimal conditions for a breakthrough. But on the other hand, where and how this will happen is a matter of a particular historical case and the coincidence of certain circumstances. Thus, although a particular innovation or even a macro-innovation (which later becomes evolutionarily significant for many societies) frequently emerges within a particular society at a certain moment and due to unique conditions, it is evident that the reasons and conditions for this evolutionary shift cannot be sought only in the characteristics of the society that produced it. Whatever particularly favorable conditions may arise within a given society for the emergence of social aromorphosis, they were always prepared by the development of many other preceding and contemporaneous societies, even if their efforts failed and/or were unintentional. Thus, certain evolutionary success can be provided by others' failures, which we have formulated as a rule of payment for aromorphic progress (Grinin, Markov, and Korotayev 2008: 80–81).

2.3. Evolutionary Scale and Aromorphoses

For the emergence of significant social aromorphoses, a certain social scale (much broader than that of a single society, often the scale of the World-System) and a considerable 'species' variety of social forms are required (see, *e.g*., Grinin 1997a; 1997b, 2017, 2020a). Thus, the emergence of the primary machine-production system in the English cotton industry in the 1730–1760s, and later the emergence of the steam engine system were influenced by the general level of development, integration and needs of Europe and around the world, on the one hand, and on the other, by unique features of Britain's previous history (about this see in Grinin 2003a: 139–140; Grinin, Korotayev 2015) and by events which seem quite sporadic for the emergence of machine industry. Among the latter, in particular, there was a ban on importing cotton printed fabrics from India, China, and Persia to Britain. This was a typical protectionist measure taken under pressure from woolen textile manufacturers (Mantoux 1929: 160). During the mercantilism era in European countries, including Britain, many such prohibitions were introduced, but, as a rule, they did not have revolutionary consequences. Since such a law was approved after a rigorous struggle (and, therefore, may have not been approved at all, so its

adoption is a happenstance), one may question how the machine production method would have been developed then? In our opinion, the transition could be delayed and even take place in different place, that is, outside England. However, it is highly probable that such aromorphosis would have emerged sooner or later (see interesting discussions on this topic by William McNeill [1990]). Therefore, the ban on importing fabric proved to be a fortunate chance (alongside other fortunate events; see also Grinin, Korotayev 2015, 2016).

It is also important to take into account that major aromorphosis can emerge only when all potential niches are filled. Only then, in attempting to conquer new niches or to compensate for the loss of these new niches, certain innovations that arose out of better adaptation or self-preservation may unexpectedly open up increased qualitative opportunities that enable progress towards more complex forms.

Therefore, the process of occupying new niches is extremely important at all levels. The emergence of nomadic societies made it possible to develop vast areas, dramatically complicate the World System, increase the production and trade, *etc*. (Korotayev, Grinin, L. and Grinin A. 2021, 2022). And this was despite the fact that nomadic societies were generally inferior in their level of complexity to sedentary ones. Thus, in comparison with sedentary societies and civilizations, we cannot talk about qualitative development (in general, when comparing systems), but in the world-system terms, it was certainly an evolution that sharply expanded and complicated the World System. In addition, the nomads had advantages in certain aspects, such as the use of pack animals, and in military affairs, and this also contributed to the selection. Thus, the expansion of niches in social evolution, as well as other aspects of evolution, will be examined in our study. But we must keep in mind that we can only dwell on some evolutionary processes.

Thus, one may argue that in a sense, the emergence of a new aromorphic quality *is always a synthesis of the supra-societal (civilizational, regional, world-systemic, and universal) scale of development and the characteristics of the society that carries out the innovation*. Moreover, a significant innovation becomes a macrosocial aromorphosis only when it spreads dramatically beyond the society that produced it. Only then is it evolutionarily consolidated and capable of triggering further transformations. |However, social evolution quite often produces innovations that do not belong to any single society, but are, so to speak, a common property. For example, Islam made the

Kaaba, which used to be a sacred place for many Arab tribes, a common property of all Muslims. And the creation of such a pan-Islamic shrine contributed to the formation of an extremely important institution of pan-Islamic pilgrimage, which played a huge role in the history of Islamic (and world) civilization (see, *e.g*., Korotayev, Klimenko, and Proussakov 1999). These institutions include universal organizations (*e.g*., League of Nations, UN).

In this context, it is important to note the following. In some cases the main driving forces may be external influences, and in others – the internal contradictions (*e.g*., social or party struggles). But we can argue that for each type of society (with account of its 'cultural code') *there is a certain limit, a ceiling of development, beyond which it cannot go without changing its cultural code*. Beyond this limit (taking into account the characteristics of the epoch), a given society can develop either as a result of falling out of the general trend and becoming a new lateral line of evolution, or under the influence of more developed neighbors and with the necessary structural transformation. Otherwise, the society enters into a crisis (*e.g*., a socio-demographic crisis), but is unable to resolve it satisfactorily, that is, radically. This is one of the explanations for the cycles of rise and decline that characterized many ancient and medieval societies (about the demographic trends in social evolution see Grinin and Grinin 2023 in this volume; Grinin *et al*. 2023 in this volume).

In these cases, the state starts the next cycle from a new point, but in its evolution it often misses the most favorable moment for such a qualitative mutation and transformation that would lead it to a new, more promising evolutionary trajectory. Development along the old evolutionary trajectory can only remove it from the point from which it was still possible to make an evolutionary leap. In other words, evolution can be significant, but its vector turns out to be different from the direction of those societies that have made such a breakthrough. The development of China is a prime example of this kind of development. There, the state and its ability to support population growth evolved from crisis to crisis until it reached astonishing levels (for details see, *e.g*., Korotayev, Malkov, and Khaltourina 2007: 68–112; Grinin 2003a: 123–124; 2007a, 1: 261–265; 2020b). But in doing so, China would move further and further away from the direction of technological and industrial capitalist development, 'chosen' by Europe, and later by all the other zones of the World System albeit mostly by force (Grinin, Korotayev 2015).

With the development of more and more new social factors (especially industrial production, science, class and party struggle, modern ideologies, *etc*.), as well as the weakening of the isolation of societies, *the role of idioadaptive evolutionary components is relatively weakened, while the role of arogenic components (components of evolutionary development) increases*. At the same time, the role of social reforms in macroevolution is becoming even more important. As humanity integrates and common problems and a kind of international 'ethics' emerge, the transformations begin to develop into what can be called social selection (when the local society 'merges' with an advanced model) and engineering (*i.e*., the construction of a model of society and the planning of its functioning and development according to that model). Of course, these paths of development are still at their early stage and have not yet fully manifested themselves. And the role of spontaneous and uncontrolled social macroevolution, although weakened, still remains highly relevant.

3. SOCIAL EVOLUTION, EVOLUTIONARY AND NON-EVOLUTIONARY DEVELOPMENT

Let us recall Spencer's definition of evolution as 'a change from an incoherent homogeneity to a coherent heterogeneity' (Spencer 1972 [1862]: 71). Although it has retained its conceptual and even aesthetic appeal to the present day, it now looks narrow. On the one hand, it deserves special attention just because one of the most important types of evolutionary processes falls under its definition, and on the other hand, it narrows the process of evolution too much. Moreover, not every movement 'from incoherent homogeneity to coherent heterogeneity' is identical with evolution, since such a movement does not always involve qualitative evolutionary changes. Evolution, both in our understanding and in Voget–Claessen's definition, is a process of qualitative changes.

And if we consider the process described by Spencer only in terms of qualitative transformations, then it is nothing more than *development*. Here it is worth emphasizing that, although among those who study social evolution, development is mainly associated with evolutionary development or social progress, there are, nevertheless, different types of development in the life of society (in particular, not only upward movement [~ evolutionary development, most clearly expressed in aromorphoses], but also development during certain re-

current phases of certain cyclical processes, without any obvious qualitative transformation from cycle to cycle).

To denote developmental processes in social dynamics, we, therefore, propose to use two terms which describe two fundamentally different types of social development: *evolutionary and non-evolutionary development*. Accordingly, the 'Spencerian' type of evolution is referred to below as e*volutionary* development, which, in relation to social systems, is to some extent as an analogue of phylogenetic development in biology. And the type of ***non****-evolutionary* social 'development' represents some (albeit in any case incomplete) analogue of biological ontogenetic development within the dichotomy between ontogenesis and phylogeny.

In particular, certain phases of the cycles of functioning/reproduction of social systems (including components of development) in societies at certain time periods can be considered as largely programmed by the systems of their existing cultural codes, values and power structures. Such 'development' should be considered *non*-evolutionary precisely because the evolutionary shifts in this case would imply changes in the 'programming' systems and structures that influence the course and direction of the functional, non-evolutionary development of the societies concerned.

The difference between non-evolutionary social development and evolutionary shifts becomes quite clear when we consider the social dynamics of certain societies during successive socio-demographic cycles. For example, in China at the very beginning of our era, during the period of recovery growth that followed the political and demographic collapse of the Western Han socio-political system that occurred in between 10 and 20 AD (after the usurpation of power by Wang Mang), there was a very intense restoration development as the new Han system was recreated out of the chaos of the 10–20s (Lee Mabel Ping-hua 1921: 178–179; Bokshchanin, and Lin Kyunyi. 1980: 30; Kryukov *et al*. 1983: 32; Malyavin 1983: 30; Bielenstein 1986; Loewe 1986: 292–297; Nefedov 2002: 140).[9] During this process, subsystems emerged (in particular, tax collection, the creation of reserves, population registration, etc.) with increasingly strong and more effective links between them. Thus, there was a dual process of differentiation and integration, a movement from the chaos of collapse to a highly organized empire, that is, development.

However, can this restoration process be considered as an *evolutionary* development? In our opinion, it cannot. In fact, something

very similar to the previous Western Han Empire emerged as a result of this restoration process. In this case, we deal with a process that in some ways resembles the process of biological ontogenetic development (remember, not related to biological evolution). After all, in the case of Eastern Han China, development was guided precisely by a kind of cultural genotype, that is, the system developed in accordance with the ideas of the Chinese elite (partly recorded in written texts) about how a centralized empire should be properly structured, and the elite aspired to restore that empire (as far as can be judged, with the support of the majority of the ordinary population [Bielenstein 1986]). As a result, the outcome (at the end of the restoration development period) was surprisingly similar to (but, of course, not identical with) the Western Han (the late 3rd century BC – early 1st century AD) socio-political system that preceded the Eastern Han.

Of course, this does not mean that the traditional socio-political system of China (and other highly complex agrarian societies with their characteristic 'secular' socio-demographic cycles [*e.g.*, Korotayev, Zinkina *et al*. 2016; Korotayev 2017]) did not experience any evolutionary development at all. On the contrary, a number of important (though in most cases quite specific) evolutionary shifts can be traced here. This organic combination of non-evolutionary and evolutionary development makes it possible to tentatively identify some important differences between social and biological evolution with regard to the processes of biological and social reproduction.

When a new biological organism appears, a significant change in the genotype (as a result of mutation) occurs only in a small minority of cases, although insignificant changes almost always occur, since replication of the entire genome without errors is also impossible. However, as a rule, their role in evolutionary development is insignificant, except in rare cases (but they are extremely important in evolutionary terms, since mutations are a necessary condition for biological evolution). During the transition from one socio-demographic cycle to another, there are always certain significant (but not necessarily aromorphic) changes in the 'socio-cultural genotype'. They occur because the intergenerational transmission of any significant amount of socio-cultural information is, in principle, impossible without changes. Unconscious distortion of the culturally significant information passed on is also inevitable (which can almost be interpreted as a complete analogue of biological mutations).[10] And this alone can lead to certain socio-evolutionary shifts (Korotayev 1997, 2003b). However, much

more important for us here is the conscious modification of this information by its bearers. Although many still believe that 'history never teaches anyone anything,' the elites of complex agrarian societies quite often tried to take into account the mistakes of their predecessors and modify the 'socio-cultural' genotype in order to avoid them. Let us recall, for example, how the founders of the Song dynasty in China (960–1279) quite deliberately changed the position of the military elite in order to eliminate the possibility of 'military coups' that had undermined the stability of the political system of their predecessors (Wright 2001).

Another, perhaps even more important difference, is that in biological evolution, the acquired characteristics are not inherited, whereas in social evolution they are inherited very often.[11]

If you teach your dog a wide variety of commands, none of these skills will be passed on to its offspring to any extent. If, during a given socio-demographic cycle, an agrarian society develops new effective technologies or creates political, social and similar institutions that prove to be highly effective, then there is high probability that these technologies/institutions will be reproduced by new generations in subsequent socio-demographic cycles. Therefore, socio-evolutionary transformations accumulate much faster than biologically useful changes caused by the mutation process. For this reason, each given socio-demographic cycle is significantly different from its predecessor, and therefore, after the period of restorative growth, further social development (during which forms and structures emerge that are different from all previous forms and structures) should already be considered precisely as evolutionary development.

It may seem that the dichotomy of social evolution and non-evolutionary (functional) development is losing its importance for modern (industrial and post-industrial) societies based on the Industrial and Scientific-Cybernetic Production Principles (see Grinin, Korotayev 2009: Ch. 2; 2015; see also Grinin 2003a, 2007b; Grinin, Grinin, Korotayev 2017; 2020), since in them the processes of social development turn out to be a component (and at the same time the most important component) of the general process of social evolution. The fact is that they have a 'built-in' need for constant change and innovation, the absence of which is perceived as a violation of the normal reproductive cycle of social systems. Therefore, development becomes increasingly conscious and part of macro-evolutionary changes. At the same time, 'secular' socio-demographic cycles disappear as the

population escapes from the 'Malthusian trap' (see Grinin, Korotayev 2009: Essay 2; also Artzrouni, Komlos 1985; Grinin, Malkov, Korotayev 2008; Korotayev 2017; see also Grinin and Grinin 2023 in this volume; Grinin *et al.* 2023 in this volume). However, we should take into account the shorter multi-year cycles characteristic of modern societies, the initial phases of which have development components that in some essential features repeat the development components of the initial phases of previous cycles.

4. MULTILINEARITY, ALTERNATIVITY AND COMPETITIVENESS OF SOCIAL EVOLUTION

4.1. Unilinear, Bilinear, Multilinear and Nonlinear Theories of Social Evolution

4.1.1. Unilinear approach and its errors

Viewing evolution as a unilinear process, which is still the case (at least with respect to sociocultural evolution), greatly simplifies and ultimately considerably distorts the evolutionary process. The result of competition, selection, and of the search for the most 'successful' evolutionary forms and models, that is, the result of very long and complex processes, are presented as if they were originally predetermined. It is explicitly or implicitly assumed that old forms are always and everywhere replaced by strictly defined (*i.e.*, described by theory) forms. For example, acephalous communities should be replaced by chiefdoms, and the chiefdoms, in turn, by the early state. But in reality, it could very often happen differently (see, *e.g.*, Korotayev, Kradin *et al.* 2000; Kradin *et al.* 2000; Bondarenko *et al.* 2002; Korotayev 2003a, 2003b; Grinin 2007c; Grinin, Korotayev 2011; Carneiro, Grinin, Korotayev 2017; Korotayev 2021).

There are two fundamental methodological errors in such approaches. The first is that evolutionarily transitional models, which were assumed to be compulsory for all societies, were theoretically constructed on the basis of the study of societies that froze at some stage. It seemed to the researchers who studied them that, since all societies go through the same stages of development, this meant that such a 'backward' society was at the stage that in the past was compulsory for all modern societies. Moreover, they did not take into account the fact that the societies under study, having been frozen at a certain stage for a long time, had rather over-developed some of their characteristics and institutions. Thus, such random examples have

often been mispresented and are presented as compulsory patterns for the development of certain institutions at a certain stage of macrosocial development, and their actually overripe states are given a greatly exaggerated importance in theoretical schemes.[12] Meanwhile, for aromorphosis, that is, for an evolutionary transition to a qualitatively new level of complexity, as we will see later, any overdevelopment of the characteristics of the corresponding level (or excessive specialization within a given level) is usually an almost insurmountable obstacle. Other conditions being equal, it is much easier for more flexible and less specialized forms to evolve. With regard to biological evolution, a similar idea was put forward and formulated at the end of the nineteenth century by Edward Cope as the Law of the Unspecialized stating that new large groups usually originate not from the most specialized representatives of ancestral groups, but from relatively unspecialized ones (see about it Markov, Neimark 1998; Rautian 1988; Grinin, Markov, Korotayev 2008, 2020).

The second error is caused by the underestimation of the fact that in the initial phases of the process of aromorphosis formation, not one, but many variants of new evolutionary forms appear. However, they are not all the same as those that 'theory' says should be compulsory. The fact is that the models that subsequently win evolutionary selection are most often not the very first, but much later, in fact, secondary, or even tertiary variations. In other words, they emerge as a result of the long-term evolution and competition of primary forms. These primary forms themselves then disappear, often without leaving obvious traces.[13] These primary fragile variants give rise to a whole range of new forms, among which there are both evolutionarily promising and evolutionarily 'lateral' forms, which have no obvious prospects, but are able to persist in certain niches for a very long time (and often have a significant impact on social systems, whose developmental trajectory later becomes dominant). Such 'lateral' variants include, for example, highly developed tribal confederations (such as the Iroquois), super-complex caste-clan systems, as well as various developed tribal forms of some nomadic and agricultural mountain peoples (especially in the Near and Middle East and North Africa). Such polities were often 'lateral' (alternative or analogous) forms of relatively complex chiefdoms and early states and existed in their niches for quite a long time, completely replacing the state structures which eventually substituted them (for more details, see Korotayev 1993, 1994, 1995, 1996, 2000a, 2000b, 2003a, 2003b, 2006, 2020a, 2021; Korotayev, Kradin *et al*.

2000; Grinin 2003c, 2004, 2007a; 2012; Grinin, Korotayev 2009b, 2011; Carneiro, Grinin, Korotayev 2017).

Of course, some institutions in such societies are already superdeveloped (in particular, this could be manifested in a highly developed system of tribal relations, in unique democratic procedures, in a specific structural hierarchy within tribes, *etc*.). The study of such individual societies, without taking into account the above-mentioned characteristics, has led some researchers to erroneously classify these overdeveloped institutions as universal ones, which should have occurred in the earlier development of the others. From here came the ideas of military or developed tribal democracy as a compulsory stage in the development of all pre-class societies, while the 'main' path (*i.e*., the one that ultimately practically crowded out most of the rest) turned out to be the path of narrowing democracy and the development of monarchical institutions (in the form of a leader, including the sacred leader). Similar (and contradicting real history) were the schemes for the evolution of communities, when they tried to transfer the characteristics of already very mature peasant communities of the late Middle Ages and the Modern Period to communities of early agriculturalists and ones of the early Middle Ages (the list of such examples is collected, in particular, in books by Leonid Alaev [1981, 2000]; see also the comparison between the late medieval German mark community and the forms of ancient German clan and rural collectives in one of the works of Aron Gurevich [1999: 37–42]).

Thus, the real precursors of the later classical models disappear, while the later evolutionary lateral variants would survive and for some time they represented alternatives to the primary aromorphoses. And theorists often interpret these lateral forms as evolutionary antecedents of classical aromorphic models. Of course, this makes the theory harmonious, but it does not correspond to reality at all. This is especially the case when forms analogous to the early state were (and still are) declared to be pre-state (see Grinin 2003, 2004; Grinin *et al.* 2004).[14]

Consequently, the unilinear approach completely distorts the course of evolution. Sometimes its adherents attribute features of later forms to earlier forms. And sometimes, on the contrary, they try to present an evolutionarily equivalent but 'lateral' alternative form as the linear ancestor of the form under study.[15] This makes it extremely difficult to compare societies and determine their real level of development. And therefore, one cannot fail to recognize the importance and productivity of the criticism of the outdated unilinear schemes of the 19th – first

half of the 20th century (see, *e.g.*, Steward 1972 [1955]; Popper 1964; 2002). As a result, an approach known as *neo-evolutionism* emerged in the 1940s and 1950s, which was based on the latest findings in cultural anthropology, archeology, sociology and history (and later biology); most its adherents regarded evolution as *multi-linear*.

However, the problem with most modern, especially American, multilinear evolutionists is that as a result of quite fair criticism of the primitive evolutionary schemes of the past, they came to the erroneous conclusion that it is wiser to abandon the search for generalizing concepts, declaring them of little value and unproductive. As a result, the focus of their academic interests shifts from the evolution of human society as a whole to the processes occurring in individual civilizations, cultures, and communities (Sztompka 1996: 152–153). They believe that 'what is lost in universality will be gained in concreteness and specificity' (Steward 1972 [1955]: 19). However, the rejection of general constructs, in fact, the fear of them, leads to eclecticism, methodological weakness, and sometimes even to 'reinventing the wheel.'

Nevertheless, in our opinion, a crude, unilinear, and schematic view of evolution and the historical process is more harmful than the indicated eclecticism and insufficient breadth of theorizing.

4.1.2. Between unilinear and multilinear approach

There are also concepts of bilinear development. This approach was especially actively developed in relation to the development problems of European and Asian countries. In Soviet scholarship, it was based on Marx's idea of the so-called Asiatic mode of production, to which an enormous amount of literature is devoted (the most comprehensive [though not always unbiased] review for the period up to the mid-1970s can be found in Vladimir Nikiforov's monograph *The East and World History* [1977, see also Kachanovsky 1971; Sawer 1977; Aleksandrov 1988; Sedov 1987; Gellner 1988: Ch. 3]). Some authors, for example, Leonid Vasiliev (1993, 1997, *etc.*) and to a lesser extent Yuri Pavlenko (1989, 2002), so strictly separated the conventional lines of development of the West and the East that practically the whole world-historical process has been viewed from the angle of the contradictions between these lines. This approach is little better than the unilinear approach and, in fact, this is its variation.

Robert Carneiro, when attempting to resolve the contradiction between the concepts of unilinear and multilinear evolutionism, noted the importance of taking into account the parameters and aspects of

the study. If the similarity of evolving institutions or structures is emphasized, then social evolution can be viewed as unilinear. If different paths are distinguished, then it can be seen as multilinear (Carneiro 1973; see also Carneiro 2003: 229–238). In some respects, of course, he is right: much depends on the aspect and methods of research and on the research task. And yet, for most scientific problems, it is absolutely necessary to take into account the multilinearity and alternativity of evolution. After all, variability is its most important and fundamental quality. It can be said that evolution always has more than one answer to emerging problems. To ignore this fact is a mistake that is confirmed, in fact, by the example of Carneiro himself, whose views on the emergence of the state can be defined as unilinear.[16]

The situation is much the same with the division of evolution proposed by Marshall Sahlins into 'general,' that is, the progress of types of forms representing movement through the stages of universal progress, and 'specific,' that is, the historical development of specific cultural forms (Sahlins 1960: 43). This is indeed a highly productive approach. However, it becomes so only with the development of an adequate methodology, since it requires extensive and carefully developed methods of application, a system of new abstract terms and categories, and 'rules of transition' from one level of research to another. But these problems are often ignored, since the laws of evolution are assumed to be of the same type at both the highest level of generalization and at the most specific level (and as we have pointed above, this is not at all the case). As a result, Sahlins's idea of diversity turns out to be declarative, and he actually tends to justify a unilinear scheme of universal forms and stages of development. This scheme has been subject to various criticisms (for more details see Korotayev, Kradin *et al*. 2000: 49–50). Sahlins's approach is somewhat similar to the attempt in Russian philosophy to separate sociological and historical laws, which was undertaken by Mikhail Barg, Efim Chernyak, Evgeny Zhukov and a number of other scholars (see, *e.g*., Zhukov *et al.* 1979), when the historical diversity of development was explained within the framework of general laws, but the analysis reduced everything to an outdated scheme (for more details, see Grinin 1997a: 83–84).

One of the authors of the present article has developed more adequate non-linear models of evolutionary development, in which it is presented not as a group of lines, but as a kind of a field. 'In reality, we speak about not a line or even a Euclidean plane or a three-dimensional space, but only about a multidimensional space-field of social

evolution' (Korotayev, Kradin *et al*. 2000: 31ff). But, of course, given the immense complexity of evolution, which cannot be contained in any theory, we are well aware that lines, the three-dimensional space, field, *etc*. are nothing more than elements of models that, by definition, simplify reality and cannot be given self-sufficient significance. Ultimately, evolution is a collective scientific category that brings together in our minds a lot of different changes and processes, and we can use different techniques to explain it, but the most important thing is not to start considering them as ontological and existing in themselves.

On the other hand, as we noted earlier (Korotayev, Kradin *et al.* 2000; Korotayev 2003b), it seems quite possible to talk about the evolutionary line/trajectory (or developmental line) of a certain society or certain social system, which is particularly important for us in the context of our research: after all, this point implies the possibility of talking about the direction/trajectory (or line) of the development of the World System.

4.2. Alternativity and Competitiveness of Social Evolution

Recognizing the multilinearity of social evolution, we proceed from the assumption that for each level of complexity of social evolution it is possible to identify certain developmental alternatives. Different social and political forms coexisted and competed with each other for a long time, and in retrospect, the non-mainstream lines, models and options could prove to be more competitive and appropriate for a number of specific environmental and social niches, than those that later became dominant (*e.g*., about the evolution the statehood see Grinin 2004, 2012, 2020b; about the technological evolution see Grinin 2007c, 2012; see also Grinin L. and Grinin A. 2023). Therefore, the statement about an inevitable outcome of evolution is usually true only in the most general sense (and only if certain conditions are met), when it is presented as the result of long-term competition between different forms, their decline, transformations, social selection, adaptation to different environmental conditions, *etc*. But for each individual society, such a result may not have been inevitable.

Besides, the emergence of an aromorphically promising solution (a new and universally distributed valuable quality or promising model) is not always realized and not everywhere, but only in special situations and places of the most successful combination of the necessary conditions, that is, at first it occurs quite rarely. Only when these characteris-

tics and patterns repeatedly prove their evolutionary advantage do they become more common. Thus, methodological difficulties arise from the underestimation of the fact that the main path of aromorphic macroevolution is not immediately perceived, but that a) it is, in fact, born in long-term competition with non-main paths; b) it adapts for a long time to different conditions in order to become the mainstream and achieve universal distribution (or at least spread in the main zones of the World System). Otherwise, for example, why was it so difficult for states to emerge in different regions over more than four thousand years, if the main path of evolution had been immediately felt and paved?

5. DRIVING FORCES AND CHANGES IN THE 'ALGORITHM' OF SOCIAL MACROEVOLUTION

It is obvious that a change in the balance of driving forces leads to a change in the manifestation of certain historical laws – for example, historical/social selection, which in modern conditions no longer leads to the physical elimination of 'backward' societies and, especially, their population, but on the contrary, such societies can become the object of special attention of the world community. And the system of population regulation in the framework of industrial and post-industrial production ensures that demographic development no longer leads to the Malthusian outcome, that is, socio-demographic catastrophes (Korotayev, Zinkina *et al*. 2011).[17] In addition, the whole system of relevant historical laws and driving forces of historical development is significantly modified: some laws and forces cease to be relevant, because conditions of their relevance disappear, while other laws, which describe socio-historical dynamics in new conditions, come to the fore (one of the most striking examples is the processes of globalization).

To some extent, albeit rather conditionally, we can speak about a system of changing types of macroevolution. In particular, we can identify two major changes in the nature of macroevolution. The first is *the transition during the period of anthropogenesis from biological to social macroevolution;* the second *is a transition within the framework of social macroevolution from socio-natural to socio-historical macroevolution during the Agrarian Revolution*.

During anthropogenesis, biological macroevolution was first transformed into biological-social evolution; then into socio-biological evolution; and only then into social evolution proper (see, in particular: Grinin 2006a, 2006b; Grinin, Korotayev 2007b, 2009a; Grinin, Grinin, Korotayev 2020). However, during the period of the Hunter-

Gather Production Principle, there were still few major aromorphoses, so the pace of the socio-evolutionary process was relatively slow, and the direction of social macroevolution was very unclear. This type of social macroevolution can be called social-natural while we define the respective level of productive forces as a natural type (Grinin 2003a, 2003b). As a result of a system of interdependent major social aromorphoses associated with the Agrarian Revolution, a transition to a socio-historical type of macroevolution gradually took place. Hence, social macroevolution significantly changes its 'algorithm', which significantly influenced the modification of laws and their relevance for different major eras. As an example of how the significance of laws and the operation of the "algorithm" of social macroevolution change, we can consider similar transformations during the Agrarian Revolution (for more details about the Agrarian Revolution see (Shnirelman 1989; Grinin 2003a; Grinin, Korotayev 2006, 2009a; Grinin, Grinin, Korotayev 2020; Malkov *et al.* 2023).

The main factor of change in the societies with the foraging economy was the need to adapt to the environment (also as a result of peopling of more and more new territories with unusual natural conditions – from the deserts of Australia to the icefields of the Arctic, which was only possible with a significant modification of the corresponding socio-cultural systems). This eventually allowed humans to colonise most of the Earth's landmass and create a huge variety of tools, objects, social and other institutions. A successful adaptation allowed people not only to survive, but often to live quite 'comfortably' in the original affluent society, as Marshall Sahlins (1972) put it. The nature of the relationship between humans and the environment varied considerably, but it was generally adaptive to the natural environment (see, *e.g.,* Leonova, Nesmeyanov 1993; see also Grinin 2003b, 2003a: 82–83; Grinin, Korotayev 2009a).

During the agrarian epoch, the nature of these relationships changes due to the transition to a fairly meaningful and active transformation of the environment on a large scale (irrigation, cutting down and burning forests, plowing virgin soil, applying fertilizers, etc., not to mention the creation of cities, roads and other infrastructure facilities). The use of natural forces is also expanding significantly, including the power of animals, wind and water (previously only fire was actively used). Natural raw materials are transformed into completely

new materials and things (metals, glass, fabrics, and pottery) (see, *e.g*., Grinin, Grinin, Korotayev 2020; Malkov *et al*. 2023).

Thus, in the process of social evolution, social factors themselves began to play an increasingly important role, which, unlike natural ones, are associated with goal setting, that is, the setting and implementation of certain goals. Gradually, with economic and technological progress, an increase in the ability to accumulate a relatively surplus product, as well as an increase in the overall cultural complexity of social systems, evolution becomes almost purely social. As a result, the "vector" of evolutionary selection turned out to be directed not so much at the ability of societies to adapt to the natural environment, but at their ability to survive and thrive in a social environment, which implies the ability to withstand competition with neighbors in military, trade, cultural or other spheres. Among the important changes in the 'algorithm' of social evolution, the following should be noted:

- **Enabling the Resource Accumulation Mechanism**

For tens of thousands of years of foraging economy, there was practically no long-term accumulation in the material field. Only knowledge, traditions and technologies were accumulated (and then to a limited extent), but there was no continuous line here either. In fact, accumulation occurred not so much within the framework of each society, but as a whole due to the growth in the number of societies and population, due to the appearance of various things and tools (see about it in Grinin and Grinin in this volume). In other words, it is almost impossible to talk about any economic sector of accumulation before the Agrarian Revolution (with the apparent exception of some highly specialized societies of hunters, gatherers, and fishermen).

In many cases, people were able to produce much more than they actually needed, and societies of primitive 'affluence' and even relative idleness often emerged, like the societies of wild sago gatherers who worked for a small part of the year, engaging in various kinds of unproductive activities, including military and ritual activities, for the rest of the year (Shnirelman 1983, 1989). The inability and/or reluctance to accumulate slowed down development, and for this reason alone, the slow pace of social evolution was virtually inevitable (see about this contradiction in Grinin 2003a, 2007b). The emergence in the societies of early farmers and pastoralists of the opportunity, and then the desire to accumulate material objects, led to fundamental changes in the field of functional differentiation, distribution, social

stratification, exchange and trade, in terms of the development of property relations, preparing societies for statehood and its analogues as well as to the acceleration of population growth (see Grinin and Grinin in this volume).

- **The increasing capacity of societies to transform themselves**

Agrarian societies have proved to be generally more capable of major social transformation than hunter-gatherer societies. At the same time, complex/super-complex agrarian (state/quasi-state, civilized) societies proved to be much more capable of such transformation than simple farmers and pastoralists.

The increasing ability of societies to change very clearly demonstrates the main difference between social evolution and biological evolution: as we noted earlier, social organisms can be consciously and purposefully transformed by the activity of their members.

- **The rise of contacts between societies to a leading place among the evolutionary factors**

The importance of various contacts has increased sharply, and this has contributed to a more active adaptation of societies to the surrounding social environment. The increasing role of contacts has radically increased the importance of external social driving forces (see also Grinin 1997b: 23; Grinin and Korotayev 2009, 2010: 177). And this has been of great importance for the development of the World System and humanity as a whole. Military and other interactions forced us to think about increasing the efficiency of management, defence, cultural systems, technology, *etc*. All this together made it possible to include many societies and peoples in a single historical (world-system) process.

It is worth noting that the process of increasing the size of societies began not only due to natural population growth, but also because of their integration and unification, that is, these external contact factors proved to be the most important in the evolutionary process.

NOTES

[1] About the correlation between megaevolution and social evolution as well as about the common features all types of evolution including social one see (Grinin L. and Grinin A. 2019, 2020; Grinin A., Grinin L. 2020; Grinin 2013, 2014a, 2017, 2018a, 2019b, 2019c, 2020a; Korotayev 2020b).

[2] Biological evolution is predominantly additive, that is, it has a cumulative nature, whereas social evolution has a predominantly substitutive nature (see above), which is especially noticeable in the last two centuries.

[3] Sometimes, rather surprising statements were made: 'The political development of African societies occurred at all stages with the *decisive role of the internal algorithm determined* by the interaction between the community and the supra-communal power structure. The evolution of the latter mainly depended on external factors' (Bocharov 1991: 74; *emphasis added*. – *LG*, *AK*). It turns out that although the main factor was the internal interaction between the community and the authorities, for some reason the evolution of the power structure *depended mainly on external factors*. What a strange logic! Would it not be more appropriate to say that political development depends to a large extent on both internal and external factors?

[4] For a thorough criticism of such approaches, as well as the question of the role of wars and other external factors in the process of state formation, see in Grinin 2003c, 2004, 2007a; 2014b, 2014c; Grinin, Korotayev 2009b, 2012). But let us emphasize once again that the division between external and internal factors is somewhat arbitrary, since external forces in one system of coordinates become internal forces in another system (for more details, see Grinin 1997b, 2007a, 2007b, 2020b; Korotayev 1997, 2003b; Akaev *et al*. 2023; Sadovnichy *et al*. 2023).

[5] By 'transient' we mean those evolutionary changes which can be further used over very long epochs and on a very large scale, in fact turning into 'winners' in evolutionary selection. By universal we mean those that sooner or later diffuse throughout the entire World System.

[6] But these are often societies whose evolution itself belongs to the macroevolutionary level. For example, this was the case with the Roman Empire, where Christianity originated.

[7] For example, the world religions were quite easily borrowed (Korotayev 2004), while the pagan religions were much more difficult to borrow. It is also easy to remember how long it took the institution of the state to spread in the period before the beginning of the 1st millennium BC. And then the invention of iron, the diffusion of agriculture to new territories, the development of trade, the emergence of money and other technological innovations began to draw people increasingly into statehood. And when empires began to impose them directly, the process went even faster (Grinin, Korotayev 2009b).

[8] And not at the level of large groups of societies, within which special 'transient' societies can be distinguished that become pioneers, hegemons or models to be followed.

[9] The Western Han Empire existed from the late 3rd century BCE to the early 1st century CE. It is also known as the Early Han (sometimes Elder Han) as opposed to the Late Han or Eastern Han empire (or Younger Han), which existed in 25–220 CE.

[10] Richard Dawkins comes to similar results in his concept of 'meme evolution' (Dawkins 2006)

[11] Since, as evolutionists note, one of the differences between social and biological evolution is the absence in the former of a clear equivalent of genotype–phenotype differences (for an analysis of this situation, see: Mesoudi *et al*. 2006:

344–345), it is obvious that we use the terms 'sociocultural genotype' and 'sociocultural phenotype' largely as a metaphor or analogy, which is quite useful, but does not claim to be a theory. And of course, these terms should not be taken too literally.

[12] Thus, ethnologists often try to find in all late primitive societies the institutionalized, clearly expressed and ritualized authoritarian power of the leader, or a high degree of sacralization, which in fact is only characteristic of more complex societies and later models of development. This is similar to attempts to transfer the characteristics of developed monarchies and the class structure of the eighteenth-century European states to the early Middle Ages (however, some theorists do just that). Similarly, unsuccessful extrapolations can be traced in the attempts to draw a single line in the development of forms of kinship, marriage, gender or religious customs, and much else. Moreover, very often in more developed societies, phenomena resembling primitiveness (*e.g.,* communal systems) were simply new formations, unrelated in any way to earlier forms (about this see below; see also Alaev 1981, 2000; Korotayev, Obolonkov 1989, 1990; Korotayev 2003c). These errors were also linked to the fact that evolutionists and determinists, supporting unilinear approach, attributed to certain characteristics the exclusive role of the main indicators of the level of development of a society, whereas in reality societies with a similar level of socio-cultural complexity could have significantly different variants of the corresponding characteristics (this applies, *e.g*., to forms of clan groups, in particular matrilineal and patrilineal; different forms of property: private and collective; forms of economy; political states: centralized and decentralized, *etc.*).

[13] This was pointed out, in particular, by Pierre Teilhard de Chardin (2008). Norbert Wiener also drew attention to this, while emphasizing that we know very little about what happens during critical periods of instability (Wiener 1953). In biology, this feature of evolution is sometimes formulated as the rule of 'archaic diversity' (the term was introduced by Yuri V. Mamkaev [1968]; see also: Rasnitsyn [2002]).

[14] For example, the advanced Gallic polities (each with a population of hundreds of thousands of people) or even the empire of Genghis Khan are considered pre-state, thereby putting them on the same level as some tiny chiefdoms or small independent village communities.

[15] To illustrate how such approaches change the understanding of the evolutionary process, we can recall that Neanderthals were presented as an evolutionary stage on the path to Homo sapiens. And now scientists tend to believe that Neanderthals (Homo sapiens neanderthalensis) and Homo sapiens sapiens were for some time parallel species (or parallel subspecies of the same species). This gives our understanding of anthropogenesis a completely different character. About Neanderthals see Claessen 2020.

[16] For example, Carneiro writes that when we deal with political evolution, we undoubtedly encounter *unilinearity*. All human societies were once migratory groups, then, after the transition to agriculture, they became mostly autonomous villages. Then the villages developed into chiefdoms which included many villag-

es, and then a number of chiefdoms developed into a state. Thus, *there was a single general line of evolution leading to the emergence of all states*: local groups – autonomous villages – chiefdoms – states (Carneiro 2003: 234; almost the same position he holds in Carneiro, Grinin, Korotayev 2017).

[17] However, COVID-19 has shown that the pandemic threats far from vanish, moreover, manmade mortal infections can sweep out hundreds of million lives (about COVID-19 see, *e.g.*, Rodrigue 2021; Widdowson 2021; Grinin, Grinin, Korotayev 2021).

REFERENCES

Akaev, A., Malkov, S., Bilyuga, S., Malkov, A., Musieva, J., and Korotayev, A. 2023. Modeling social self-organization and historical dynamics. A general approach. In Sadovnichy, V. *et al.* (eds.), *Reconsidering the Limits to Growth. A report to the Russian Association of the Club of Rome* (pp. 253–307). Cham: Springer. https://doi.org/10.1007/978-3-031-34999-7_15.

Alaev, L. B. 1981. *Rural Community in North India. The Main Stages of Evolution*. Moscow: Nauka. *Original in Russian*.

Alaev, L. B. 2000. *L. B. Alaev: Community in His Life. History of Several Scientific Ideas in Documents and Materials*. Moscow: Vostochnaya Literatura. *Original in Russian*.

Aleksandrov, Y. G. 1988. On the Formational Specificity of Pre-Colonial Eastern Societies. *Narody Azii i Afriki* 2: 23–34. *Original in Russian*.

Artzrouni, M., and Komlos, J. 1985. Population Growth through History and the Escape from the Malthusian Trap: A Homeostatic Simulation Model. *Genus* 41 (3–4): 21–39.

Averkieva, Yu. P. 1978. Indians of the Northwest Coast of North America (the Tlingit). In Averkieva, Yu. P. (ed.), *The North American Indians* (pp. 318–360). Moscow: Progress. *Original in Russian*.

Barfield, T. J. 1991. Inner Asia and Cycles of Power in China's Imperial History. In Seaman, G., and Marks, D. (eds.), *Rulers from the Steppe: State Formation on the Eurasian Periphery* (pp. 21–62). Los Angeles, CA: Ethnographics Press.

Bessmertny, Y. L. 1972. The Emergence of France. In Manfred, A. Z. (ed.), *History of France*. Vol. 1 (pp. 9–68). Moscow: Nauka. *Original in Russian*.

Bielenstein, H. 1986. Wang Mang, the Restoration of the Han Dynasty, and Later Han. In Twitchett, D., and Loewe, M. (eds.), *The Cambridge History of China.* 1: *The Ch'in and Han Empires, 221 B.C. – A.D. 220* (pp. 223–290). Cambridge, UK: Cambridge University Press.

Blair, P. H. 1966. *Roman Britain and Early England 55 B.C. – A.D. 871*. New York – London: W. W. Norton and Company.

Bocharov, V. V. 1991. Political Systems of Tropical Africa: From Tribe to State. In Ilyin, Yu. M., Popov, V. A., and Sledzevsky, I. V. (eds.), *Tribe*

and State in Africa (pp. 65–75). Moscow: Institute of African Studies, Russian Academy of Sciences. *Original in Russian*.

Bokshchanin, A. A., and Lin Kyunyi. (Eds.). 1980. *Materials on the Economic History of China in the Early Middle Ages (Sections 'Sho ho zhi' of Dynastic Histories).* Moscow: Nauka. *Original in Russian*.

Bondarenko, D. M., Grinin, L. E., and Korotayev, A. V. 2002. Alternative Pathways of Social Evolution. *Social Evolution & History* 1: 54–79.

Borodkin, L. I. 2007. Synergetics and History: Modelling of Historical Processes. In Malkov, S. Yu., Grinin, L. E., and Korotayev, A. V. (eds.), *History and Mathematics: Analysis and Modelling of Socio-Historical Processes* (pp. 8–48). Moscow: KomKniga/URSS. *Original in Russian*.

Braudel, F. 2009. *L'Identité de la France*. Tome 2. *Les hommes et les choses*. Paris: Flammarion.

Carneiro, R. L. 1973. The Four Faces of Evolution. In Honigman, J. J. (ed.), *Handbook of Social and Cultural Anthropology* (pp. 89–110). Chicago, IL: Rand McNally.

Carneiro, R. L. 2003. *Evolutionism in Cultural Anthropology. A Critical History.* Boulder, CO: Westview.

Carneiro, R. L., Grinin L., and Korotayev A. (eds.) 2017. *Chiefdoms: Yesterday and Today.* Clinton Corners – New York: Eliot Werner Publications, Inc.

Chadwick, N. 1987. *The Celts.* London: Penguin books.

Chubarov, V. V. 1991. The Middle Eastern Locomotive: The Developmental Pace of Technique and Technology in the Ancient World. In Korotayev, A. V., and Chubarov, V. V. (eds.), *The Archaic Society: The Main Problems of Developmental Sociology.* Vol. 1 (pp. 92–135). Moscow: Institute for History, Academy of Sciences, USSR. *Original in Russian*.

Claessen, H. J. M. 1989. Evolutionism in Development. *Vienne Contributions to Ethnology and Anthropology* 5: 231–247.

Claessen, H. J. M. 2000. Problems, Paradoxes, and Prospects of Evolutionism. In Kradin, N. N., Korotayev, A. V., Bondarenko, D. M., de Munck, V., and Wason, P. K. (eds.), *Alternatives of Social Evolution* (pp. 1–11). Vladivostok: FEB RAS.

Claessen, H. J. M. 2002. Was the State Inevitable? *Social Evolution & History* 1: 101–117.

Claessen, H. J. M. 2010. On Early States – Structure, Development, and Fall. *Social Evolution & History* 9 (1): 3–51.

Claessen, H. J. M. 2018. Sacred Kingship: Cases from Polynesia. *Social Evolution & History* 17 (2): 3–26.

Claessen, H. J. M. 2020. Neandertals – Life, Work, and Vanishing. *Social Evolution & History* 19 (1): 3–20.

Clark, G., and Piggott, S. 1970. *Prehistoric Societies*. Harmondsworth: Penguin.

Dawkins, R. 2006. *The Selfish Gene*: 30th Anniversary edition. OUP Oxford. URL: https:// books.google.ru/books?id=EJeHTt8hW7UC.

Filip J. 1962. *Celtic Civilization and It's Heritage*. Prague: New Horizons.

Filippov, I. S. 1990. The Emergence of the Feudal System in Western Europe. In Udaltsova, Z. V., and Karpov, S. P. (eds.), *History of the Middle Ages.* Vol. 1 (pp. 42–84). Moscow: Vysshaya Shkola. *Original in Russian*.

Gellner, E. 1988. *Plough, Sword and Book. The Structure of Human History*. Chicago, IL: The University of Chicago Press.

Girenko, N. M. 1991. *The Sociology of the Tribe*. Leningrad: Nauka. *Original in Russian*.

Grinin, A., and Grinin L. 2020. Crossing the Threshold of Cyborgization. *Journal of Big History* 4 (3): 54–65.

Grinin, L. E. 1997a. Formations and Civilizations. Ch. 1 *Filosofiya i obschestvo* 1: 10–88. *Original in Russian*.

Grinin, L. E. 1997b. Formations and Civilizations. Chapter 2. *Filosofiya i obshchestvo* 2: 5–89. *Original in Russian*.

Grinin, L. E. 1997c. Formations and Civilizations. Chapter 3. *Filosofiya i obshchestvo* 3: 5–92. *Original in Russian*.

Grinin, L. E. 2003a. *Productive Forces and Historical Process*. 2nd ed. Volgograd: Uchitel. *Original in Russian*.

Grinin, L. E. 2003b. *Philosophy, Sociology and Theory of History*. Volgograd: Uchitel. *Original in Russian*.

Grinin, L. E. 2003c. The Early State and its Analogues. *Social Evolution & History* 2 (1): 131–176.

Grinin, L. E. 2004. The Early State and its Analogues: A Comparative Analysis. In Grinin, L. E., Carneiro, R. L., Bondarenko, D. M., Kradin, N. N., and Korotayev, A. V. (eds.), *The Early State, its Alternatives and Analogues* (pp. 88–136). Volgograd: Uchitel.

Grinin L. E. 2006a. Periodization of History: A Theoretic-Mathematical Analysis. In Grinin, L. E., de Munck, V., Korotayev, A. V. (eds.), *History & Mathematics: Analyzing and Modeling Global Development* (pp. 10–38). Moscow: KomKniga/URSS.

Grinin, L. E. 2006b. Periodization of History: A Theoretic-Mathematical Analysis. In Grinin, L. E., Korotayev, A. V., Malkov, S. Yu. (eds.), *History & Mathematics: Problems of Periodization Historical Macroprocesses* (pp. 53–79). Moscow: KomKniga/URSS. *Original in Russian*.

Grinin, L. E. 2007a. *State and Historical Process*. In 3 vols. Moscow: KomKniga/URSS. *Original in Russian*.

Grinin, L. E. 2007b. Problems of Analyzing the Driving Forces of Historical Development, Social Progress and Social Evolution. In Semyonov, Yu. I.,

Gobozov, I. A. and Grinin, L. E. (eds.), *Philosophy of History: Problems and Prospects* (pp. 148–247). Moscow: KomKniga. *Original in Russian*.

Grinin, L. E. 2007c. Production Revolutions and the Periodization of History. *Herald of the Russian Academy of Sciences* 77 (2): 150–156.

Grinin, L. E. 2007d. The Relationship between the Size of Society and the Evolutionary Type of Polities. In Korotayev, A. V., Malkov, S. Yu., Grinin, L. E. (eds.), *History and Mathematics: Analysis and Modelling of Socio-Historical Processes* (pp. 263–303). Moscow: ComKniga/URSS. *Original in Russian*.

Grinin, L. E. 2008. The Role of the Individual in History. *Herald of the Russian Academy of Sciences* 78 (1): 64–69.

Grinin L. E. 2009. People of Celebrity. In Grinin L. E., Belyaev D. D., Korotayev A. V. (eds.), *Hierarchy and Power: Cultural Aspects* (pp. 183–206). Moscow: KomKniga/URSS.

Grinin L. E. 2010. The Role of the Individual in History: A Reconsideration. *Social Evolution & History* 9 (2): 95–136.

Grinin L. E. 2012. *Macrohistory and Globalization.* Volgograd: Uchitel.

Grinin L. E. 2013. *Big History of the Universe's Development: Cosmic Evolution*. Moscow: Moscow branch of Uchitel publishing house. *Original in Russian.*

Grinin L. E. 2014a.The Star-Galaxy Era of Big History in the Light of Universal Evolutionary Principles. In Grinin, L. E., Baker, D., Quaedackers, E., and Korotayev, A. V. (ed.), *Teaching & Researching Big History: Exploring a New Scholarly Field* (pp. 163–187). Volgograd: 'Uchitel' Publishing House.

Grinin L. E. 2014b. *Political Systems of Early States.* Proceedings of the Conference on Political Systems of Early States, June 19–22, 2013, Xi'an, China / Edited by Lin Yuan, L. E. Grinin, A. V. Korotayev, and Jianping Yi. Beijing: Science Press. *In Chinese*.

Grinin L. E. 2014c. Early State and Ancient Democracy. In Lin Yuan, Grinin, L. E., Korotayev A. V., and Jianping Yi (eds.), *Political Systems of Early States.* Proceedings of the Conference on Political Systems of Early States, June 19–22, 2013, Xi'an, China (pp. 74–85). Beijing: Science Press. *In Chinese*.

Grinin, L. E. 2017. *Big History of the Universe's Development: History and Evolution of the Solar System*. Moscow: Moscow branch of Uchitel publishing house. *Original in Russian*.

Grinin L. E. 2018a. Evolution of the Early Solar System in Terms of Big History and Universal Evolution. *Journal of Big History* 2 (1): 15–26. URL: http://lowellgustafson.com/2018/01/.

Grinin L. E 2018b. Historical Materialism in Western Marxism. Reflections on the fate of the concept. *Voprosy filosofii* 10: 90–101. DOI: 10.31857/S004287440001153-3. *Original in Russian*.

Grinin L. 2019a. The Processes of Systemic Integration in the World System. In Grinin L. E. *et al.* (eds.), *Globalistics and Globalization Studies: Globalization Studies and Evolutionary Trends* (pp. 152–173). Volgograd: Uchitel Publishing House.

Grinin, L. 2019b. Evolution of the Early Solar System in Terms of Big History and Global Evolution. In Grinin L., Korotayev A. (eds.), *Evolution: Evolutionary Trends, Aspects, and Patterns* (pp. 76–92). Volgograd: Uchitel.

Grinin L. 2019c. Was there a Big Bang? *Journal of Big History (JBH)* VIII (1): 51–59. https://jbh.journals.villanova.edu/article/view/2339.

Grinin L. 2020a. *The Big History of the Universe's Development: The Planets of the Solar System. Their History and Evolution. Chemical Evolution in Space and on Earth.* Moscow: Moscow branch of Uchitel publishing house. *Original in Russian*.

Grinin L. 2020b. *State and Historical Process*: in 3 vols. Moscow: KomKniga/URSS. *Original in Russian*.

Grinin, L., Grinin, A. 2019. The Star-Galaxy Era in Terms of Big History and Universal Evolution. *Journal of Big History*, III (4): 69–92.

Grinin, L. E., and Grinin A. L. 2020. Social Evolution as an Integral Part of Universal Evolution. *Social Evolution & History* 19 (2): 19–45.

Grinin, L. E., and Grinin A. L. 2021. How Can Covid-19 Change Geopolitics and Economy? In Grinin, L. E., Ilyin, I. V., and Korotayev, A. V. (eds.), *Globalistics and Globalization Studies: Current and Future Trends in the Big History Perspective* (pp. 15–27). Volgograd: 'Uchitel' Publishing House.

Grinin, L. E., and Grinin A. L. 2023. Historical Materialism: Does the Concept Have a Future? *Social Evolution & History* 22 (1): 143–178.

Grinin L. E., Grinin A. L., Korotayev A. 2017. Forthcoming Kondratieff Wave, Cybernetic Revolution, and Global Aging. *Technological Forecasting & Social Change* 115: 52–68.

Grinin, L., Grinin, A., and Korotayev, A. 2020. A Quantitative Analysis of Worldwide Long-Term Technology Growth: From 40,000 BCE to the early 22nd century. *Technological Forecasting and Social Change* 155: 1–15. https://doi.org/10.1016/j.techfore.2020.119955.

Grinin, L. E., and Korotayev, A. V. 2006. Political Development of the World System: A Formal Quantitative Analysis. In Turchin, P., Grinin, L., Korotayev, A., and de Munck, V. (eds.), *History and Mathematics. Historical Dynamics and Development of Complex Societies* (pp. 115–153). Moscow: KomKniga/URSS.

Grinin, L. E., and Korotayev, A. V. 2007a. Political Development of the World-System: Formal and Quantitative Analyses. In Malkov, S. Yu., Grinin, L. E., Korotaev. A. V. (eds.), *History and Mathematics: Macrohistorical Dynamics of Society and State* (pp. 49–101). Moscow: KomKniga/URSS. *Original in Russian*.

Grinin, L. E., and Korotayev, A. V. 2007b. Social Macroevolution and Historical Process (To the Problem Formulation). *Filosofiya i Obschestvo* 2: 19–66. *Original in Russian*.

Grinin, L. E., and Korotayev, A. V. 2007c. Towards the Development of Mathematical Models for the Escape from the Malthusian Trap. In Malinetsky, G. G. (ed.), *Mathematical Modeling of Historical Processes* (pp. 20–23). Moscow: Institute of Applied Mathematics named after. M. V. Keldysh RAS. *Original in Russian*.

Grinin, L. E., and Korotayev, A. V. 2008. History and Macroevolution. *Istoricheskaya psikhologiya i sotsiologiya istorii* 2: 59–86. *Original in Russian*.

Grinin, L. E., Korotayev, A. V. 2009a. *Social Macroevolution. Genesis and development of the World System*. Moscow: LIBROKOM. *Original in Russian*.

Grinin, L. E., Korotayev, A. V. 2009b. Social Macroevolution: Growth of the World System Integrity and a System of Phase Transitions. *World Futures* 65 (7): 477–506.

Grinin, L. E., Korotayev, A. V. 2009c. The Epoch of the Initial Politogenesis. *Social Evolution & History* 8 (1): 52–91.

Grinin, L. E., Korotayev, A. V. 2010. The Artzrouni-Komlos Model of Economic and Demographic Development of World System and the Theory of Production Revolutions. In Korotayev A. V., Malkov S. Yu., Grinin L. E. (eds.), *History and Mathematics: Analysis and Modeling of Global Dynamics* (pp. 143–185). Moscow: LIBROKOM.

Grinin, L. E., Korotayev, A. V. 2011. Chiefdoms and Their Analogues: Alternatives of Social Evolution at the Societal Level of Medium Cultural Complexity. *Social Evolution & History*. Special Issue. Chiefdoms: Theories, Problems, and Comparisons. 10 (1): 276–335.

Grinin, L. E., Korotayev, A. V. 2012. Emergence of Chiefdoms and States: A Spectrum of Opinions. *Social Evolution & History* 11 (2): 191–204.

Grinin, L. E., and Korotayev, A. V. 2015. *Great Divergence and Great Convergence. A Global Perspective*. Cham: Springer International Publishing.

Grinin, L. E., and Korotayev, A. V. 2016. *The Near East, India, and China*. Moscow: Moscow branch of Uchitel publishing house. *Original in Russian*.

Grinin, L. E., Korotayev, A. V., Markov A. V. 2011. Biological and Social Phases of Big History: Similarities and Differences of Evolutionary Principles and Mechanisms. In Grinin, L. E., Korotayev, A. V., and Ro-

drigue, B. H. (eds.), *Evolution: A Big History Perspective* (pp. 158–198). Volgograd: Uchitel Publishing House.

Grinin, L. E., Markov, A. V., Korotayev, A. V. 2008. *Macroevolution in Animate Nature and in Society*. Moscow: LKI. *Original in Russian*.

Grinin, L. E., Markov, A. V., and Korotayev, A. V. 2009. Aromorphoses in Animate Nature and Society: The Experience of Comparing Biological and Social Forms of Macroevolution. In Grinin, L. E., Markov, A. V., Korotayev, A. V. (eds.), *Evolution: Cosmic, Biological, Social* (pp. 176–225). Moscow: LIBROKOM. *Original in Russian*.

Grinin, L., Markov, A., and Korotayev, A. 2013. On Similarities between Biological and Social Evolutionary Mechanisms: Mathematical Modeling. *Cliodynamics* 4 (2): 185–228.

Grinin, L. E., Markov, A. V., and Korotayev, A. V. 2014. Mathematical Modeling of Biological and Social Evolutionary Macrotrends. In Grinin, L. E., and Korotayev, A. V. (eds.), *History & Mathematics: Trends and Cycles. Yearbook* (pp. 9–48). Volgograd: 'Uchitel' Publishing House.

Grinin, L. E., Korotayev, A., & Markov, A. 2020. Big History and Macroevolution. Evolutionary Principles and Mechanisms at Biological and Social Phases of the Big History. In Benjamin, C., Quaedackers, E., and Baker, D. (eds.), *The Routledge Companion to Big History* (pp. 72–105). London: Routledge.

Gurevich, A. Ya. 1999. Ancient Germans. Vikings. In Gurevich A. Ya., *Selected Works*. Vol. 1. Moscow – St. Petersburg: Universitetskaya kniga. *Original in Russian*.

Ingold, T. 1986. *Evolution and Social Life*. Cambridge: Cambridge University Press.

Kachanovsky, Y. V. 1971. *Slavery, Feudalism or Asian Mode of Production?* Moscow: Nauka. *Original in Russian*.

Khara-Davan, E. 1996. Genghis Khan as a Military Leader and His Legacy. In Muslimov, I. B. (ed.), *At the Junction of Continents and Civilizations (from the Experience of Formation and Disintegration of Empires of the 10th – 16th Centuries)* (pp. 73–276). Moscow: INSAN. *Original in Russian*.

Khotzey, A. S. 2000. *Theory of Society.* In 3 vols. Vol. 2. *The Formation of Bureaucracy. Civilization*. Kazan: Matbugat Yorty. *Original in Russian*.

Korotayev, A. 1993. Sabaean Cultural-Political Area: Some General Trends of Evolution. *Proceedings of the Seminar for Arabian Studies* 23: 49–60.

Korotayev, A. 1994. Some Trends of Evolution of Sabaean Cultural-Political Area: From Clan Titles to Clan Names? *New Arabian Studies* 2: 153–164.

Korotayev, A. V. 1995. Mountains and Democracy: An Introduction. In Kradin, N. N., and Lynsha, V. A. (eds.), *Alternative Pathways to Early State* (pp. 60–74). Vladivostok: Dal'nauka.

Korotayev, A. V. 1996. *Pre-Islamic Yemen: Socio-Political Organization of the Sabaean Cultural Area in the 2nd and 3rd Centuries A.D.* Wiesbaden: Otto Harrassowitz Verlag.

Korotayev, A. V. 1997. *Factors of Social Evolution*. Moscow: Institute of Oriental Studies. *Original in Russian*.

Korotayev, A. 2000a. Chiefdom: Precursor of the Tribe?: (Some trends of the evolution of the political systems of the North-East Yemen in the 1st and 2nd millennia A. D.). In Kradin, N. N., Korotayev, A. V., Bondarenko, D. M., de Munck, V., and Wason, P. K. (eds.), *Alternatives of Social Evolution* (pp. 242–257). Vladivostok: Far Eastern Branch of the Russian Academy of Sciences.

Korotayev, A. 2000b. North-East Yemen (1st and 2nd Millennia A.D.). In Bondarenko, D., and Korotayev, A. (eds.), *Civilizational Models of Politogenesis* (pp. 191–227). Moscow: Inst. for Afr. Stud. Press.

Korotayev, A. 2003a. Penetration of Nomads to the Arabian South and Formation of Tribal Organization among the North-East Yemen Agricultural Population. In Kradin, N. N., Bondarenko, D. M., and Barfield, Th. J. (eds.), *Nomadic Pathways in Social Evolution* (pp. 114–122). Moscow: Institute for African Studies.

Korotayev, A. 2003b. *Social Evolution: Factors, Regularities, Trends*. Moscow: Vostochnaya literatura. *Original in Russian*.

Korotayev, A. 2003c. Unilineal Descent Groups and Deep Christianization: A Cross-Cultural Comparison. *Cross-Cultural Research* 37 (1): 132–156.

Korotayev, A. 2004. *World Religions and Social Evolution of the Old World Oikumene Civilizations: A Cross-Cultural Perspective*. Lewiston, NY: The Edwin Mellen Press.

Korotayev, A. V. 2006. *Social History of Yemen*. Moscow: KomKniga/URSS. *Original in Russian*.

Korotayev, A. 2017. Malthusian Cycle. In Moghaddam, F. M. (ed.), *The SAGE Encyclopedia of Political Behavior* (pp. 457–462). Thousand Oaks, CA: SAGE.

Korotayev, A. 2020a. Evolution of Sociopolitical Institutions in North-East Yemen (The 1st Millennium BCE – the 2nd Millennium CE). In Bondarenko, D. M., Kowalewski, S. A., Small, D. B. (eds.), *The Evolution of Social Institutions. Interdisciplinary Perspectives* (pp. 161–184). Cham: Springer.

Korotayev, A. 2020b. The 21st century Singularity in the Big History Perspective. A re-analysis. In Korotayev, A. V., LePoire, D. (eds.), *The 21st century Singularity and Global Futures* (pp 19–75). *A Big History perspective*. Cham: Springer.

Korotayev, A. 2021. From Chiefdom to Tribe? Trends in the Evolution of Political Systems in North-Eastern Yemen in the Last Two Millennia. *Nouvelles Chroniques du manuscrit au Yémen* 32: 93–115.

Korotayev, A. V., Grinin, L. E., and Grinin, A. L. 2021. Mathematical Model of Interaction between Civilization Center and Tribal Periphery: A Description. *Social Evolution & History* 20 (2): 50–78.

Korotayev, A. V., Grinin, L. E., and Grinin, A. L. 2022. Mathematical Model of Interaction between Civilization Center and Tribal Periphery: An Analysis. *Social Evolution & History* 21 (1): 65–97.

Korotayev, A., Klimenko, V., and Proussakov, D. 1999. Origins of Islam: Political-Anthropological And Environmental Context. *Acta Orientalia Academiae Scientiarum Hungaricae* 53 (3–4): 243–276.

Korotayev, A., Kradin, N., de Munck, V., and Lynsha, V. 2000. Alternativity of Social Evolution: Introductory Notes. In Kradin, N. N., Korotayev, A. V., Bondarenko, D. M., de Munck, V., and Wason, P. K. (eds.), *Alternatives of Social Evolution* (pp. 12–51). Vladivostok: FEB RAS.

Korotayev, A., Malkov, S., and Khaltourina, D. 2006. *Introduction to Social Macrodynamics. Secular Cycles and Millennial Trends*. Moscow: KomKniga/URSS.

Korotayev, A., Markov A. V., and Leonid E. Grinin. 2015. Modeling of Biological and Social Phases of Big History. In Grinin, L. E., and Korotayev, A. V. (eds.), *Evolution: From Big Bang to Nanorobots* (pp. 111–150). Volgograd: 'Uchitel' Publishing House.

Korotayev, A. V., and Obolonkov, A. A. 1989. The Clan Organization in the Socio-Economic Structure of Class Societies. *Sovetskaya etnografiya* 2: 36–45. *Original in Russian*.

Korotayev, A. V., and Obolonkov, A. A. 1990. Kin as a Form of Social Organization in the Works of Pre-Revolutionary Russian and Soviet Researchers. In Ashrafyan K. Z., Kim G. F. (eds.), *Basic Problems of the History of Pre-Capitalist Societies of the East* (pp. 3–52). Moscow: Nauka. *Original in Russian*.

Korotayev, A., Zinkina, J., and Andreev, A. 2016. Secular Cycles and Millennial Trends. *Cliodynamics* 7 (2): 204–216.

Korotayev A., Zinkina J., Kobzeva S., Bogevolnov J., Khaltourina D., Malkov A., Malkov S. 2011. A Trap at the Escape from the Trap? Demographic-Structural Factors of Political Instability in Modern Africa and West Asia. *Cliodynamics* 2 (2): 276–303.

Kradin, N. N., Korotayev, A. V., Bondarenko, D. M., and Lynsha, V. A. (Eds.). 2000. *Alternative Paths to Civilisation*. Moscow: Logos. *Original in Russian*.

Kradin, N. N., Korotayev, A. V., Bondarenko, D. M., de Munck, V., and Wason, P. K. (eds.) 2000. *Alternatives of Social Evolution*. Vladivostok: FEB RAS.

Kryukov, M. V., Perelomov, L. S., Sofronov, M. V., and Cheboksarov, N. N. 1983. *Ancient Chinese in the Epoch of Centralized Empires.* Moscow: Nauka. *Original in Russian*.

Kubbel, L. E. 1988. The Emergence of Private Property, Classes and the State. In Bromley, Y. V. (ed.), *History of Primitive Society. The Epoch of Class Formation* (pp. 140–269). Moscow: Nauka. *Original in Russian*.

Lee Mabel Ping-hua. 1921. *The Economic History of China, with Special Reference to Agriculture.* New York: Columbia University Press.

Le Roux F. 1961. *Les Druides*. Paris: Presses universitaires de France.

Loewe, M. 1986. The Conduct of Government and the Issues at Stake (A.D. 57–167). In Twitchett, D., and Loewe, M. (eds.), *The Cambridge History of China.* 1: *The Ch'in and Han Empires, 221 B.C. – A.D. 220* (pp. 277–322). Cambridge, UK: Cambridge University Press.

Luhmann N. 2000. *The Reality of the Mass Media*. Stanford, CA: Stanford University Press.

Leonova, N. B., and Nesmeyanov, S. A. (Ed.). 1993. *Problems of Palaeoecology of Ancient Societies.* Moscow: Russian Open University. *Original in Russian*.

Lowie, R. H. 1920. *Primitive Society.* New York: Boni and Liveright.

Malkov, S., Kovaleva, N., Grinin, L., and Korotayev, A. 2023. Modeling Social Self-organization and Historical Dynamics. Agrarian society. In Sadovnichy, V. *et al.* (eds.), *Reconsidering the Limits to Growth. A report to the Russian Association of the Club of Rome* (pp. 309–335). Cham: Springer. https://doi.org/10.1007/978-3-031-34999-7_16.

Malyavin, V. V. 1983. *The Demise of the Ancient Empire.* Moscow: Nauka. *Original in Russian*.

Mamkayev, Yu. V. 1968. Comparison of Morphological Differences in Lower and Higher Groups of the Same Phylogenetic Stem. *Zhurnal obschei biologii* 29: 48–55. *Original in Russian*.

Mantoux P. 1929. *The Industrial Revolution in the Eighteenth Century: An Outline of the Beginnings of the Modern Factory System in England*. Transl. by Marjorie Vernon. London: Jonathan Cape.

Markov, A. V., and Naimark, E. V. 1998. *Quantitative Regularities of Macroevolution*. Moscow: Geos. *Original in Russian*.

McNeill, W. H. 1990. *Rev.: Ernest Gellner. Plough, Sword, and Book: The Structure of Human History.* Chicago: University of Chicago Press.

Melnikova, E. A. 1987. *Sword and Lyre: Anglo-Saxon Society in History and Epos*. Moscow: Mysl. *Original in Russian*.

Mesoudi, A., Whiten, A., and Laland, K. 2006. Towards a Unified Sciences of Cultural Evolution. *Behavioral and Brain Sciences* 29: 329–383.

Mongait, A. L. 1974. *Archaeology of Western Europe. Bronze and Iron Ages*. Moscow: Nauka. *Original in Russian*.

Nefedov, S. A. 2002. On the Theory of Demographic Cycles. *Economic History* 8: 116–121. *Original in Russian*.

Nikiforov, V. N. 1977. *East and World History*. Moscow: Nauka. *Original in Russian*.

Pavlenko, Y. V. 1989. Early Class Societies: Genesis and Paths of Development. Kiev: Naukova Dumka. *Original in Russian*.

Pavlenko, Y. V. 2002. *History of World Civilization. Philosophical Analysis*. Kiev: Feniks. *Original in Russian*.

Popper, K. R. 1964 [1957]. *The Poverty of Historicism*. New York: Harper & Row.

Popper, K. 2002. *Open Society and Its Enemies*. London: Routledge.

Rasnitsyn, A. P. 2002. The Process of Evolution and the Methodology of Systematics. *Proceedings of the Russian Entomological Society* 73: 1–108. *Original in Russian*.

Rodrigue, B. H. 2021. Disaster's Offspring: Catastrophe, Narrative, and Survival in Global History. *Journal of Globalization Studies* 12 (1): 161–173.

Sadovnichy, V., Akaev, A., Ilyin, I., Malkov, S., Grinin, L., Aleshkovski, I., and Korotayev, A. 2023. Macrohistorical approach. In Sadovnichy, V., *et al.* (eds.), *Reconsidering the Limits to Growth. A report to the Russian Association of the Club of Rome* (pp. 17–33). Cham: Springer. https://doi.org/10.1007/978-3-031-34999-7_2.

Sahlins, M. D. 1960. Evolution: Specific and General. In Sahlins, M. D., and Service, E. R. (eds.), *Evolution and Culture* (pp. 12–44). Ann Arbor, MI: The University of Michigan Press.

Sawer, M. 1977. *Marxism and the Question of the Asiatic Mode of Production*. The Hague: Martinus Nijhoff.

Severtsov, A. N. 1939. *Morphological Regularities of Evolution*. Moscow – Leningrad: Publishing House of the USSR Academy of Sciences. *Original in Russian*.

Severtsov, A. N. 1967. *The Main Directions of the Evolutionary Process*. Moscow: Moscow University. *Original in Russian*.

Severtsov, A. S. 1987. *Criteria and Conditions for the Emergence of Aromorphic Organization*. In Tatarinov, L. P., and Rasnitsyn, A. P. (eds.), *Evolution and Biocenotic Crises* (pp. 64–76). Moscow: Nauka. *Original in Russian*.

Schmalhausen, I. I. 1969. *The Problems of Darwinism*. Leningrad: Nauka. *Original in Russian*.

Schieder, Th. 1965. Möglichkeiten und Grenzen vergleichender Methoden in der Geschichtwissenschaft. *Historische Zeitschrift* 200: https://doi.org/10.1524/hzhz.1965.200.jg.529.

Sedov, L. A. 1987. Towards a Typology of Medieval Social Systems of the East. *Narody Azii i Afriki* 5: 52–61. *Original in Russian*.

Semyonov, Y. I., Gobozov, I. A., and Grinin, L. E. 2007. *Philosophy of History: Problems and Prospects.* Moscow: KomKniga/URSS. *Original in Russian*.

Shemyakin, Y. G. 1992. Theoretical Problems of the Study of the Phenomenon of Alternativity. In Manekin, P. V. (ed.), *Alternativity of History* (pp. 12–75). Donetsk: Donetsk branch of SAMI. *Original in Russian*.

Shkunayev, S. B. 1989. *Community and Society of the Western Celts*. Moscow: Nauka. *Original in Russian*.

Shtaerman, E. M. 1951. Ancient Gaul. A Review of Postwar Bourgeois Historiography. *Vestnik drevnei istorii* 35: 209–215. *Original in Russian*.

Shnirelman, V. A. 1983. The Sago Gatherers. *Voprosy istorii* 11: 182–187. *Original in Russian*.

Shnirelman, V. A. 1989. *The Emergence of the Producing Economy*. Moscow: Nauka. *Original in Russian*.

Spencer, H. 1972. *On Social Evolution: Selected Writings*. Chicago: University of Chicago Press. URL: https://books.google.ru/books?id=XIdHAQAAIAAJ.

Steward, J. H. 1972 [1955]. *Theory of Culture Change: The Methodology of Multilinear Evolution*. Urbana: University of Illinois Press.

Sztompka, P. 1996. *Sociology of Social Changes*. Wiley-Blackwell.

Teilhard de Chardin, P. 2008. *The Phenomenon of Man*. Harper Perennial Modern Thought.

Thévenot, E. 1960. *Histoire des Gaulois*. Paris: Presses Universitaires de France.

Van Parijs, P. 1981. *Evolutionary Explanation in the Social Sciences: An Emerging Paradigm*. Totowa, NY: Rowman and Littlefield.

Vassiliev, L. S. 1993. *History of the East.* Vol. 1. Moscow: Vysshaya Shkola. *Original in Russian*.

Vassiliev, L. S. 1997. General Outlines of the Historical Process (the Draft of Theoretical Construction). *Filosofiya i obschestvo* 1: 89–155. *Original in Russian.*

Voget, F. W. 1975. *A History of Ethnology*. New York: Holt, Rinehart & Winston.

Wells P. S. 2011. The Iron Age. In Milisauskas, S. (ed.), *European Prehistory. Interdisciplinary Contributions to Archaeology* (pp. 461–464). Springer.

White, L. A. 1949. *The Science of Culture. A Study of Man and Civilization*. N. Y.: Farrar, Straus and Company.

Widdowson, M. 2021. From Covid-19 to Zero-Gravity: Complex Crises and Production Revolutions. *Journal of Globalization Studies* 12 (1): 119–145.

Wiener, N. A. 1953. A Machine Wiser than Its Maker. *Electronics* 26 (6): 368–374.

Wright, D. C. 2001. *The History of China.* Westport, CT: Greenwood.

Yoffee, N. 1979. The Decline and Rise of Mesopotamian Civilization: An Ethnoarchaeological Perspective on the Evolution of Social Complexity. *American Antiquity* 44: 5–35.

Zhukov, E. M., Barg, M. A., Chernyak, E. B., and Pavlov, V. I. 1979. *Theoretical Problems of the World-Historical Process*. Moscow: Nauka. *Original in Russian*.