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THE INTERRELATIONSHIP BETWEEN NATURAL SELECTION AND SOCIOGENESIS IN HUMAN EVOLUTION

ABSTRACT. — Mutual relation of natural selection and sociogenesis in evolution of human society has been studied and compared with that of lower grades of sociogenesis. Whereas the intensity of natural selection decreases with the deepening of the social way of life, all changes in the direction of sociogenesis continue to belong among the most important ones. The increase of intraspecific fighting in the course of anthropogenesis has been conditioned by the decreased pressure of natural selection and, at the same time, by the not yet sufficiant strength of the human reason. All human history shows, however, that larger and larger groups of people can unite and live in peace and cooperate in favour of all of them. It is assumed that all intraspecific fighting in the human society will disappear as completely as it did in the evolution of social insects, or, as it did in all antagonistic relations among cells in multicellular organisms.

KEY WORDS: Sociogenesis — Natural selection — Intraspecific fighting — Human reason — Cooperation — Class society — Antisocial instincts — Main trend in evolution.

The origin of man and hence of human society, the basis of the highest, psychosocial form of motion of matter, is one of the two highest qualitative changes known at present, one of the two greatest revolutions in the whole evolution of matter. At the same time it represents an evolutionary change about which we know at present most and which is best accessible to human understanding. About the other of these two most important revolutions, the origin of life on the Earth, we know considerably less and it is much less accessible to us already on the temporal basis. As far as the origin of the chemical form of the motion from the physical one is concerned, such as it takes place, e.g. at the surface of the Sun, our knowledge is minimal and the problem of the origin of the physical form of the motion has not yet been even clearly formulated. Thus already from such philosophical point of view the problem of human evolution deserves maximal attention. However, as far only very little attention has been paid to this problem from the point of view of the general evolutionary laws. My present paper will be concerned with a single one of this set of problems, i.e., with the question of mutual relationship between natural selection and sociogenesis during the evolution of the human society.

The natural selection, the basis, importance, and mode of acting of which was demonstrated by Charles Darwin (1859) in his basic work, can be defined as a gradual accumulation of advantageous deviations during generations, taking place by removal or limitation of individuals with less advantageous properties, resulting in its turn from all unfavourable influences in the natural environment. The recognition of this law has made it possible to explain in a natural way all the purposefulness encountered in nature, including the most perfect adaptations. As put by Darwin himself, the action of natural selection results in creation of both eagle's eye and of human hand or brain.

However, the principle of natural selection is up to the present time often completely misunderstood, both in biology and in the individual social sciences (cf. Novák, 1978, etc.). Till this time namely it happens to be confused with the intraspecific fight for survival and thus quite incorrect ideas concerning its essence and mode of acting originate. I have shown (Novák, 1963, 1978, 1979) that this erroneous interpretation, leading to very harmful consequences, was initiated from some formulations by Darwin himself, even when he understood the nature of the natural selection perfectly, as it can be demonstrated by countless quotations from his writings. It is typical in this respect that most of Darwin's followers and adherents promoted just this erroneous concept of the natural selection. After an equally mistaken extrapolation to the human society, this deformed conception served as a seemingly scientific basis of such malignant products of the human thought like racism, fascism or, in a less acute form, of the bourgeois nationalism and the priciple of the free competition. If it really were so that the natural selection together with its exceedingly favourable consequences would result from the intraspecies struggle (as it is believed, among others, by the so-called social Darwinists) then all tendencies to supress and eliminate weaker individuals from their own species would mean something positive, since it would invigorate natural selection and improve the welfare of the species.

In reality, just the opposite is true. Firstly, natural selection occurs through an integral action of all unfavourable influences of the environment and the harmful influences coming from the individuals of the same species represent among them, as shown by us (Novák, 1978, etc.) only an exceedingly small contribution — on the average, when all unfavourable factors and all organisms are taken into account, the amount to less than 1 %. At the same time, from the very standpoint of the natural selection, all tendencies to the intraspecies fighting are being continually eliminated as harmful for the survival of the species. The species (or, more exactly, the mutation) which would in addition to all unfavourable influences of the environment destroy itself by the intraspecies fight, would always have a disadvantage as compared with the same species without a similar tendency and hence it would be sooner or later eliminated by natural selection. This conclusion is supported by numerous observations that various properties of both plants and animals, their morphological characteristics, physiological mechanisms and instincts aim at preventing the intraspecies fight (e.g., various devices for scattering seeds of plants and various instincts scattering young animals as soon as they become independent of their parents), whereas there is not a single property serving specifically to the intraspecies fighting. On the contrary the highest selection value, i.e., positive significance from the point of view of the natural selection belongs to all properties of organisms resulting in a mutual support and cooperation among individuals of the same species. This was shown for the first time by K. F. Kessler (1882), professor of zoology of German origin in St. Petersburg of that time. His idea was developed in detail and supported in a truly Darwinian way by an enormous amount of specific examples by his pupil, the well-known "prince-anarchist", Piotr Alexeyewich Kropotkin (1902). The occurence of various forms of mutual cooperation among both, plants and animals, in other words, of sociability, is enormous. There is not a single animal or plant species, in which we would not encounter it, in some extent or another.

From all forms of socialibity the greatest importance and extension belongs to that which I called *sociogenesis* (Novák, 1967, 1975, 1977, 1980). Originally I used simply the term sociability (Novák, 1967, 1975), but it seems to be more suitable to leave to the term sociability its original broader sense in which it was used by Kropotkin i.e., as a designation of all types and phenomena of mutual assistance and cooperation between individuals of the same species (in contrast with symbiosis of different species) and to use the term sociogenesis for cases I have described, i.e. for associations resulting in origin of individuals of higher degree (in analogy with symbiogenesis, Margulis, 1970). Between realities corresponding to the two concepts transient forms can be found, analogously as between pairs of antitheses.

The validity of the principle of sociogenesis as one of the most general laws of the evolution of organisms follows from the validity of the following three main facts.

1. All organisms both contemporary ones and those known from their fossil remnants from earlier geological periods belong to one of the following 5 levels or grades of individuals, or, some of them, form transitions between two of the levels next to each other. Individuals of the 1st grade are the so-called monomolecular organisms and include the most simple of the contemporary viruses such as viroids and plasmids. They are formed by a single molecule of nucleic acid, DNA or RNA, and are "living" only in a certain environment of proteins, interacting with corresponding molecules of proteins (or the earlier proteinoids). Their only phenomenon of life and, at the same time, of metabolism is the replication reaction, during which, of course, they cease to be a single molecule. Individuals of the IInd grade are unicellular organisms, starting with bacteria and blue-green algae and including unicellular plants (various species of unicellular algae) as well as unicellular animals (Protozoa). Individuals of the 3rd grade are simple multicellular organisms comprising all lower plants (Thallophyta), i.e. multicellular algae and fungi (Mycophyta), even when many of them form stable colonies. The transition towards the individuals of the 4th grade are Bryophyta, i.e. liverworts and mosses. Individuals of the 4th grade are formed by integrated colonies of the individuals of the 3rd grade and include vascular plants (Cormophyta) as well as metameric animals, i.e. annelids (Annelida), molluscs (Mollusca), arthropods (Arthropoda), echinoderms (Echinodermata) and chordates (Chordata). Among animals the transition to this grade of individuals is represented by bryozoans or moss animals (Bryozoa). Finally individuals of the 5th grade comprise integrated colonies or societies of individuals of the 4th grade, i.e. tufts of cormus plants (Cormophyta) and societies of metameric animals. The complete integration into an individual of the 5th grade is achieved only by the human society; not at a biological level, to be sure, but on the level of a new, psychosocial form of the motion of matter.

2. The second of the three basic facts, following essentially from the reality of evolution, says that each individual of higher grade passed during its phylogenesis through all the lower grades. The logical consequence of this reality is that any contemporary organism, including each man, had as an ancestor one definite individual at the unicellular level (grade II) and one definite molecule of nucleic acid (grade I individual). These predecessors, of course, need not to be, but they might have been identical for all the contemporary individuals of the given species.

3. The third fact shows that the law of sociogenesis is equally general as that of the natural selection and shows that the evolution of an individual of a lower grade to the next higher grade individual passed through the same main stages in all grades, through the so-called phases of sociogenesis in each grade. We can recognize the following 5 phases of sociogenesis: a) the nonseparation which is the mechanism of the origin of a colony or society and consists in preservation of the original connections between newly formed (new born) daughter individuals up to the adult stage. Each reproduction involves namely two processes: the multiplication proper and the separation of originating individuals. Preservation of their interconnections (for a time usually also with the mother individual) for the whole individual life which is basis of non-separation possesses thus the character of neoteny. b) The second phase consists in a differentiation of the originally identical daughter individuals of a colony, which can involve their chemical composition, function or morphology, but is never hereditary, i.e., it has the character of a modification (polymorphism). c) The third phase consists in the origin of an internal medium (e.g. body fluids, i.e. blood and lymph in animals) which is for the given individual more favourable than its external medium. d) What follows is the phase of evolution of means of correlation, e.g. tracheae and phytohormons in vascular plants, endocrine and nervous systems in animals. e) The last, fifth phase of sociogenesis is then the integration into an individual of a higher grade. Each of these phases occurs by a sequence of gradual hereditary changes (mutations).

Between natural selection and evolution in the sense of sociogenesis and actually between each evolutionary step in this direction there is, of course, a close connection. Each step forward in the direction of sociogenesis at each of the above phases has, as already mentioned, maximal selection value, greater than any change concerning individual properties only. Moreover, any progress in the sense of sociogenesis decreases the dependence of the given form (species) on unfavourable influences of the environment and reduces thus the further action of the natural selection. This applies during the whole evolution of organisms, starting with the first replicating molecules of nucleic acids, when the natural selection begins to act. (In non-living nature, before the beginning of autoreproduction, there is no natural selection. It is foreshadowing different stability and hence different abundance of various abiotic systems of organic substances such as proteinoid coacervates or microspheres.) The same is, of course, valid in the whole acting of the natural selection, even when individual properties are concerned — any better adaptation brought about by the natural selection results in a higher resistance against unfavourable influences and hence it reduces further action of the selection. At the same time the relation between the two principles, natural selection and sociogenesis, is throughout dialectical and it changes in the course of evolution. In the present paper I would like to point out some of its specific aspects during the evolution of man.

Prerequisites of the evolution in the sense of anthropogenesis were two main properties of the predecessors of man on the level of anthropoids of our time, which lived at that period still in tropical forests. Firstly it was a high level of nervous activity, which achieved in higher mammals the psychic level, and then the beginning of the social mode of life (formation of groups): the two characteristics can be observed with contemporary anthropoids. The importance of these two features of man's ancestors from the point of view of natural selection still increased after their descent to the ground, caused by climatic changes. It was the combination of these two properties which undoubtedly formed the main basis for further evolution of the human society and brought about additional factors stimulating this development, i.e., above all, the intentional human labour. By this, it is justified to call the highest form of the motion of matter the psychosocial form, which term is still used in most of the marxistic literature.

Hence the first phase of sociogenesis in the evolution of man, the non-separation, arose already at the pre-human stage of the most ancient hominids. For a deeper understanding of causal relations of anthropogenesis it is essential to realize that both the origin of sociogenesis and the evolution of the higher level of nervous function had most probably a common cause, i.e., the increasing neoteny. (Cf. Novák, Přívratský, 1980 and Přívratský, 1980). The preservation of the state of the early ontogenesis (of morphological, physical and etological properties) resulted in preservation of a more advantageous higher ratio of the size of head and hence of brain to the size of the rest of the body, which is a prerequisite for its rapid increase and, at the same time, it brings about conservation of juvenile state of sociability. The latter is of importance for nonexistence of antagonistic patterns of behaviour (in the instinctive behaviour and later more and more

in the behaviour based on conditioned reflexes and consciousness), which is prerequisite of further evolution in the sense of sociogenesis. All the progress in this direction is strongly preferred by the natural selection (e.g., by the protection against beasts of prey, against hunger by common efforts to obtain food, etc.).

On the other hand, the differentiation phase in man was reached only in connection with the development of labour on the primitive human level, even if its first indications in such features as dominance and social hierarchy are found already in many primates. In man, unlike in the societies of social insects, this phase is limited to the functional differentiation, i.e., to the division of labour, but it reaches a far greater variability. From a purely biological point of view sociogenesis is more advanced with social insects. However, it should be realized that the human type has its advantages — the preservation of biological equality of all members of a society makes possible substantially greater developmental (hereditary) plasticity. It is a manifestation of the law of non-specialization, some features of which were recently mentioned by Dubinin (1975). This again is of importance from the viewpoint of natural selection.

The third phase of sociogenesis, i.e. the evolution of internal medium, interferes considerably with natural selection. It begins with seeking suitable shelters for the whole society (group) and, after mastering the fire, in the regulation of their microclimate. Among the first such inner surroundings of the prehistoric man were also caves. Later on leather tents and then wooden constructions were erected. Here other type of importance of this phase of sociogenesis from the point of view of natural selection should be realized. Whereas the protection against unfavourable effects of the weather limited the action of natural selection on one hand, it enabled the man of that time (probably the predecessors of the genus Homo already) to penetrate into the regions with cooler and thus less favourable climate, extending thus the action of natural selection for the corresponding individuals on the other hand. With this fact is probably connected the greater activity and adaptability of people living in the mild and cool climatic zones, whereas in the optimal conditions of warm climate (tropical and subtropical zones) individuals with less advantageous properties could permanently survive. This again serves as an evidence for the dialectical relation between the two principles.

The evolution of correlations (fourth phase) occurred in the evolution of man in two ways. At first it was the development of language as of the means of transmitting and receiving individual experience — the basis of the so-called social heredity (Dubinin, 1975). During the prehuman stage this function was performed in a rudimentary extent by imitation, which has not ceased with the development of language; on the contrary it was further deepened and intensified and helped, especially during the juvenile period, the learning on the basis of language. The language is more or less automatically related to the development of the art of writing and later that of printing, as well as that of the most modern means of communication such as telephone, telegraph, film, broadcasting and television. Another mode in the evolution of the means of correlation was the development of transport, the communication in the narrow sense of word. The first means of transportation were doubtless various animals. The highest level was reached by using the horse; the horse is partly still used even in the technically most advanced societies. To use animals for transportation of people and other burdens, various devices were used; at first sledges and after the invention of the wheel various carriages. From this point of view, the development leading to the contemporary railway and car transportation is obvious. In a similar way the transportation by ships developed and, at the time being in a most rapid manner, the transportation in air, its climax in the space being the transportation by rockets. This, of course, belong already to the period when natural selection in human society practically does not exist any more (apart from some limited cases) and is more and more replaced by human intelect.

The superiority of human society from the point of view of sociogenesis over societies of other animals is most clearly evident in its highest phase, i.e. in integration, to be sure, on a psychosocial rather than biological level. Whereas human individuals retain a great deal of their individual character, e.g., in comparison with social insects, as to the social spirit as a collective product of human thought and hence a summary experience over thousands of generations (cf. Linhart and Novák, 1980), the human society has reached here the full stage of integration, although we are standing at the beginning with respect to the possibilities of its utilization. At the same time, although the social spirit arises and develops only through the mediation of brains or rather through the nervous activity of individuals, it represents a fully integrated phenomenon, independent of individuals who have formed it and determines in a decisive extent their thinking and activity. The relationship between social being, social activity and social as well as individual consciousness is made clear by *Fig. 1.*

As the sociogenesis of human society continues developing, the influence of natural selection in human evolution weakens. Man creates ever more effectively an optimal microclimate by his clothing, housing, and the way to air-conditioning. Hygiene and the continuously improving medical methods permit him to evade infectious diseases and to prevent (although still in a meagre degree) various civilization diseases and deteriorations of his environment due to his own activities. The development of science offers him the little utilized chance to secure food and all other amenities of life and to create optimum conditions for the development of all capabilities of every individual. When this stage is reached, all natural selection will practically cease.

We often encounter views, popular among physicians, that this cessation of natural selection (substantially supported by their own improvement of medical care and discoveries of more efficient medical treatments) represents something unsound and detrimental to the further evolution of mankind. This is certainly an erroneous view. First of all, we must bear in mind, that the influence of natural selection, in spite of the remarkable results achieved by it throughout the three and half billions years of organic evolution on the Earth, is a very lengthy process and rather wasteful and inefficient with regard to the resulting effects. Although in the long run it is highly reliable in forming adaptability and usefulness it is literally blind with respect to advantageous qualities of individuals. Let us consider, for instance, how many men of genius died while young, before they could express all their exceptional abilities simply because they possessed insufficient resistance toward some trivial bacteria, such as those causing cholera or pneumonia, or because they decreased momentarily their attentiveness and succumbed to a traffic accident. Let us consider how many men have to die very young for various accidental reasons before their genius could even be recognized.

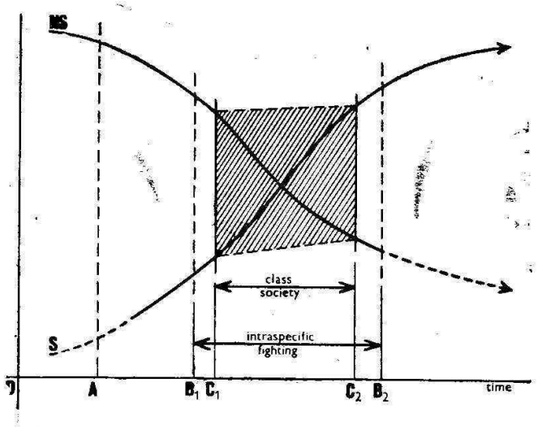

FIGURE 1. *The mutual relation between natural selection and sociogenesis in the evolution of man. (From Novák, 1982).*
NS — natural selection, S — sociogenesis, A — the beginning of the human society, B_1 — the beginning of the intraspecific fighting, C_1 — the beginning of the class society, B_2 — the end of the intraspecific fighting, C_2 — the end of the class society. Lettice zone — the class society.

Moreover, the role of natural selection is not vacant, it is taken by the human intelect, which itself is a product of natural selection and can not only replace this role, but rather to perform it more efectively and considerately. It does not achieved its aims only in a negative way, i.e. by the elimination of less suitable deviations, but it uses above all selection of the most desirable deviations. It is not at all my intention to support various attemps of an active or passive eugenics, which might have, at the intemporary level of genetic knowledge, harmful effects even when used with maximal responsibility and with exclusion of all possibilities of a misuse. Moreover, such experiments could influence only the biological part of man, whereas from the social point of view those of his properties controlled by the laws of the psychosocial level are vastly more important. Still, I believe that apart of creation of optimal conditions for the evolution of all positive properties in all men also the selection of talented people is of importance as well as taking a maximum advantage of them, i.e. creation of optimal conditions for their development and putting them on places where they will be most useful to the society.

All scientifically well-founded efforts "to improve human beings" have to aim at maintaining and fully manifesting the maximal genetic variety, so that not a single gene is lost (cf. e.g., Dobzhansky, 1977). It is to be realized that even such hereditary properties which are less favourable in the given generation, could bring men of genius in another combination in new generations. Cases are known when undoubtedly negative properties have a positive effect since they represent a permanent stress, forcing man to concentrate on the most important activity and stimulates him to a maximal efficiency. From this point of view any eugenic interventions in man are not desirable, whether positive (i.e. selection of positive properties as improvements of plants and animals) or negative (i.e. removing properties which appear to us as unfavourable, quite undesirable and harmful). We have to consider that all such interventions could limit the adaptability of man during possible environmental changes in the future. At least in one direction the eugenic efforts are not to be fully dismissed. By this I do not mean qualitative interventions, i.e. dominances or elimination of any properties, but rather scientifically based care or maintenance of individual types of genes. This is actually the second, essential part of the effort to preserve a most variable genom. Revolutionary changes in the human society during the development of science and technology and also the development of social relations with the progress of integration as the highest phase of sociogenesis changes the living conditions of people to such a degree that considerable changes in proportions of individual genes can occur, together with an increase of undesirable properties, instead of positive properties. Physicians interested in this field point out that in connection with the decrease of the infant mortality and with an improved care of adults with various hereditary defects, the number of people with various hereditary mental and physical disorders increases. We can also observe the fact that individuals with hereditarily lowered intelligence are less responsible and hence they provide more numerous progeny. As I have shown, the assistance from the point of view of what I have called quantitative eugenics (Novák, 1980b) is not tedious but rather in agreement with principles of the socialist order and socialist health-care. It would be sufficient to accept the law, according to which people with a proved danger of a hereditary disease

have the right to have only a single child. In the case that the law is not observed, i.e., another child is born, an obligatory sterilization would follow. In this way an increase in the number of analogous defects would be prevented, without a loss of the corresponding genes. (It is known that two children are on the limit of the minimum, necessary to preserve the species.) At the same time it would be a perfectly democratic measure, not depriving anybody of the opportunity to have a progeny.

The progress of sociogenesis in the human society (and not only in this society) and related weakening of natural selection has serious and at the first sight paradoxical results. This is the human agressivness, resulting in fights among groups and leading in the period of class societies to wars of a mass or even world extent. Without any wish to neglect or weaken the importance of other reasons for the intraspecies fight, the existence of which in a class society is due to exploiting interests of ruling classes, we have to conclude from the more general evolutionary point of view that its prerequisite is the above mentioned weakening of natural selection. Considered from the biological point of view, it is a certain luxury, made possible by advantages of the social mode of life. Species with individuals living each separately on its own could not afford such a luxury; they would become extinct. This does not mean, of course, that certain tendencies to the intraspecies fighting including cannibalism could not originate in solitary species or persist for a certain time or under special circumstances. Only with the development of sociogenesis they could reach a higher extent, however. This is also supported by a resulting overpopulation of individuals of the same species in a given area and an interconnected lack of some of the main needs of the species like food, water, resting places, etc. The decisive condition, however, is the weakening of natural selection, without which all innate tendencies for intraspecific fighting would result, sooner or later, in extermination of the species.

The example of social insects shows, equally well as the community of cells (i.e. unicellular individuals originally) in the case of multicellular organisms, that the advanced evolution toward sociogenesis results necessarily in a complete elimination of all tendencies towards the intraspecific fighting within the given society even on the biological level, in the absence of any psychosocial factors. Exceptions from this rule conditioned by specific circumstances for which they become fixed by natural selection, like the killing of drones by worker bees when these accomplished their biological function and become useless or even threaten the wellfare of the colony, is just a confirmation of this rule and the role of natural selection in its evolution. Anyway, all this suggests the temporary character of the period of wars and other utterances of the intraspecific fighting. It is limited, in evolutionary perspective, also from biological reasons, beside of the reason of the psychosocial level. As mentioned above, the increase of intraspecific fighting within the human society culminating in an antagonistic class society is conditioned by the decreasing power of natural selection, with the gradual evolution of the social way of life. This evolution towards sociogenesis creates, however, social consciousness and with it the human reason which starts to replace natural selection, being itself its product. The understanding of all unfavourable conditions of mankind will lead to increasingly successful tendency to rule out and to eliminate them as did natural selection before. This necessarily also concerns the intraspecific fighting in its all utterances. On the other hand the understanding of positive effects of cooperation and all kind of positive intraspecific interactions will result in their intentional improvement and deepening. The replacement of natural selection by the human reason on the psychosocial level will thus speed up greatly the evolution in the direction of sociogenesis.

An analysis of evolutionary trends on the basis of natural selection and sociogenesis shows thus, that the existence of intraspecific fighting in the human society is limited, for both biological and psychosocial reasons, to a relative short period (short from the biological evolutionary point of view, being, however, rather long from the point of view of human history) determined by the decreasing strength of natural selection and the low level of sociogenesis and thus of the as yet undeveloped human reason *(Fig. 1)*.

A consistent evaluation of all these relations in the biological evolution of human society leads thus to an equally optimistic prognosis for the future of mankind as do the conclusions of marxism-leninism.

SUMMARY

1. Mutual relation of the two main factors of evolution, natural selection and sociogenesis, has been analysed in the course of evolution of human society.

2. Unlike the view generally spread among biologists, the intraspecific fighting has little in common with natural selection. As a character unfavourable for the survival of species, it is continuously suppressed by natural selection.

3. All changes in the direction of sociogenesis and any kind of intraspecific cooperation belong among the most favoured by natural selection.

4. Whereas the intensity of natural selection decreases with the evolution of human society due to the improving chance for survival with the social way of life, sociogenesis evolves continuously like in the lower grades of individuals.

5. The action of natural selection is gradually replaced by that of the human reason as one of the main components of the social consciousness during the evolution of human society.

6. The increase of intraspecific fighting in the course of anthropogenesis has been conditioned by a decrease in the pressure of natural selection and, at the same time, by the not yet sufficient strength and effectiveness of the human reason.

7. The period of intraspecific fighting in the human society coincides approximately with the period of class structure of the society. It may be assumed that it will disappear with it thanks to the strengthening human reason as completely as did all antisocial instincts thanks to natural selection in the evolution of social insects, or, all antagonistic relations among cells in multicellular organisms.

8. The analysis of the action of natural selection and sociogenesis and their interrelation in the human society shows that further improving and deepening of all positive mutual relations among people is one of the main trends in the evolution of life at all levels.

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