

W. M. Burień

The Laws of Organisms Selfformation = Prawo samotworzenia się organizmów

Humanistyka i Przyrodoznawstwo 6, 25-31

2000

Artykuł został zdigitalizowany i opracowany do udostępnienia w internecie przez Muzeum Historii Polski w ramach prac podejmowanych na rzecz zapewnienia otwartego, powszechnego i trwałego dostępu do polskiego dorobku naukowego i kulturalnego. Artykuł jest umieszczony w kolekcji cyfrowej bazhum.muzhp.pl, gromadzącej zawartość polskich czasopism humanistycznych i społecznych.

Tekst jest udostępniony do wykorzystania w ramach dozwolonego użytku.

W. M. Burień

Państwowy Uniwersytet Rolniczy
w Sankt Petersburgu

State Agrarian University
in Saint Petersburg

THE LAWS OF ORGANISMS SELFFORMATION

Prawa samotworzenia się organizmów

Słowa kluczowe: komórki, wyższe formy organizmów, ewolucja chemiczna, czynniki genetyczne i pozagenetyczne, sześć praw samotworzenia się organizmów, zygota, genom.

Key words: cells, higher organisms forms, Chemical Evolution, genic and above genic factors, six laws of self formation, tygote, genome.

Streszczenie

Pierwsze komórki na Ziemi uformowały się ponad 3,5 miliarda lat temu. Około miliarda lat temu pojawiły się wyższe formy organizmów – na początku ze szkieletem zewnętrznym, później ze szkieletem wewnętrznym. Liczbę żyjących na Ziemi gatunków szacuje się obecnie na 5 milionów.

Tekst prezentuje nowoczesny materiał badawczy z dziedziny biologii, którego analiza pozwala na zrozumienie kolejności procesów, które doprowadziły do powstania tak zadziwiającej różnorodności form życia na Ziemi. Artykuł w głównej mierze dotyczy powstania pierwszych komórek. W dalszej części omówiona jest istota sześciu praw rozwoju wyższych form życia. Omawiany proces samotworzenia się organizmów spowodowany był działalnością czynników genetycznych i pozagenetycznych. Komórki dzielą się i tworzą grupy, w obrębie których zachowują się zgodnie z zasadami wytyczonymi przez sześć praw. Hasłami kluczowymi dla poszczególnych praw są:

- adhezynność komórek (dla pierwszego prawa),
- tendencja do tworzenia wielopłaszczyznowych populacji (dla drugiego prawa),
- krytyczna liczba komórek (dla trzeciego prawa),
- wewnętrzne związki komórek (dla czwartego prawa),

Abstract

More than 3,5 billion years ago first cells were formed on Earth. About one billion years ago, higher organisms – first with external skeleton next with internal skeleton – were formed. There are five million species still living on Earth now.

The author of the text presents modern biological experimental material that lets us explain the sequence of processes that led to genesis of this stunning variety of living forms. The article deals mainly with genesis of the first cells as well as the six laws of development on realization of which the formation of higher organisms is based. The process of self formation was caused by genic and above genic factors. Cells are dividing and creating populations where they behave according to the rules of the six laws. The key words for the six laws of self formation are respectively:

- adhesion of cells (for the first law),
- the ability to form multiplayer populations (for the second law),
- critical number of cells (for the third law),
- cell interconnection (for the fourth law),
- local cell differentiation (for the fifth law),
- orientation of embryonal cells (for the sixth law).

– miejscowe zróżnicowanie komórek (dla piątego prawa).

– charakterystyka komórek embrionalnych (dla szóstego prawa).

Natura, działając według zasad wytyczonych przez sześć omawianych praw, stworzyła DNA ogromnej liczby organizmów, włączając w nie człowieka, który został stworzony w podobny sposób jak każdy organizm na Ziemi.

According to the author's opinion, the method of self formation was used by nature while creating in DNA of cells a great number of organisms forms, including man, who was created as every other organism on Earth.

Od Redakcji

Redakcja, decydując się na opublikowanie artykułu profesora W. M. Burienia, pragnie zwrócić uwagę Czytelnika na kontrowersyjność ujęcia problematyki przez Autora, którego oryginalna wizja problemu genezy życia stanowi rodzaj hipotezy naukowej, mogącej wzbudzić różne opinie specjalistów. Redakcja chce jednak udostępnić Czytelnikowi tekst artykułu ze względu na jego niekonwencjonalność i dyskusyjność.

Szerzej koncepcja W. M. Burienia wyłożona została w książce *Formowanie organizmów na Ziemi*, wydanej przez Państwowy Instytut Rolniczy w Sankt Petersburgu w 1999 r.

More than 3,5 billion years ago the Miracle happened on the Earth – tiny and complex, intricate secluded structures with regulated metabolism were formed. Those were the first cells.

Their signs are still in sedimentary rocks of that time. Next 2,5 billion years the Earth was inhabited only by one – celled organisms. About one billion years ago the Second Miracle took place – higher organisms appeared. At the beginning the creatures with external skeleton, like trilobites, formatted. Organisms with internal skeleton – vertebrates – appeared 0,5 mlrd years ago – those were fishes, higher plants appeared 0,46 mlrd years ago, then amphibians (0,36 mlrd), reptiles (0,30), mammals (0,22) and birds (0,20 mlrd years ago).

The world of higher organisms is boundlessly diverse with form. More than 50 mln species appeared on the Earth, 45 mln of them have disappeared. Five million species are still living on the Earth. How could Nature create Life, living cells and all the diversity of higher organisms forms?

There are three hypotheses:

- 1) hypothesis of Creation,
- 2) hypothesis of Evolution,
- 3) hypothesis of Chemical Evolution.

Biblical Moses wrote: „Then God said, »Let the land produce vegetation: seed bear fruits with seed on it, according to their various kinds«. And it was so” (Genesis, 1,11). „And God said, »Let the water teem with living creatures...«” (Genesis, 1,20).

According to the *Evolution theory* (Ch. Darwin, 1859, 1991) and *Synthetic theory of Evolution* (Vorontsov, 1980), Nature used three systems of factors for creation a stunning variety of living forms:

- system of organisms resemblance,
- system of their unlimited changeability,
- system of their relative adaptability.

The theory of Chemical Evolution is the most well-founded and experimentally proved (mostly, indirectly). Chemical Evolution led to creation of cells (Oparin, 1924; Miller, 1959), that later formed higher organisms (Buren, 1994). Modern biological experimental material lets us explain the sequence of processes that led to genesis of cell and higher organisms.

In anaerobic conditions mineral substances absorb energy (electrical, mechanical, etc.), recombine and synthesize organic matters including the ones that are polymerizing and formatting secluded structures (membranes) with absorbed enzymes. These structures are living cells.

A long time ago, when the first cells were formatting, the Earth possessed all mineral elements, water, but air didn't contain free oxygen. Air consisted of ammonia (NH_3), CH_4 , water vapour, H_2S and other gases. That time atmosphere didn't have ozone, and all the sun energy reached the Earth.

Sunlight, radio-activity, electric charges and other kinds of energy stimulated gas molecules, their atoms turned into active state and, recombining through radicals, peculiarly formed groups. So, organic substances (aminoacids, carboglycated, lipids, etc.) were abiotically synthesized from mineral matters. C. Miller (1959) experimentally substantiated this path from mineral to organic matters.

The Earth of that time was unique, as She saved abiotically synthesized substances from oxidation. The synthesized substances interacted – aminoacids formed peptides, carbohydrates bound up by oxygen bridges (oxygen was taken from water), nucleotides bound up with carbohydrates, H_3PO_4 and polymerized fatty acids connected to glycerol and became polar – one terminus of molecule (was) moistened, another (wasn't) didn't.

Genesis of the first cells

Abiotically synthesized matters including lipids were in certain volume (drop) of water. Lipid molecules bound up with water by their hydrophilic terminuses and concentrated on water surface, hydrophobic terminuses of molecules were above this level. When the number of lipids molecules on the unit of drop surface reached critical concentration, all-round lipid layer sagged into drop and created doubled layer: hydrophobic terminuses contacted with each other, hydrophilic ones were along hydrophobic layer. It was formation of surface and internal lipid membranes. Hydrophilic terminuses interacted with abiotically synthesized protein molecules and formed membranes.

Membranes started regulating the movement of matters. Proteins located on membrane surface catalyzed the sequence of chemical reactions, that created a base for regulated metabolism. This drop was the first cell (Buren, 1994).

Cells that were living 3,5 billion years ago differed from each other by size, shape and density of internal structures. Diversity of cell forms is a very important fact which allows to consider that, at the moment of genesis, cells had genomes with different sequences of nucleotides. These differences were the result of accidental (non matrix) polymerization of nucleotides.

One-celled organisms possessed unlimited number of original (unique) genomes. Through the next generation of daughter cells, the first cells gave their genomes (most likely, slightly changed by mutations) to cells of existing organisms. When the concentration of free oxygen in the air reached 3% from modern one, oxygen started oxygenizing abiogenously synthesized matters. It happened about 1 mlrd years ago. Since that time new original combinations of nucleotides in cell DNA hadn't appeared.

Among those first cells were the cells with genomes of yeast, E. coli, butterfly, dinosaur, wheat, elephant and... man. So, Nature all at once unconsciously created in cell DNA a great number of organisms forms that used to inhabit the Earth and still inhabit it. For Nature, probably, there was no difference whose DNA to synthesize – DNA of aquatic plant (alga), amoeba, elephant or man.

Nobody could ever travel to far past to study the process of cell formation. We discuss the most probable course of those events.

Creation of living cells on the Earth was not a unique case or result of special highest form of matter. No! Facts and logic modern biology proves that Life could appear on any planet of the Universe with the same conditions as they were on the Earth 4–5 mlrd years ago.

Life is hidden in free combinations of chemical elements, in their whirlwind movement leading to creation of stable above-molecular structures. The role of the Planet where Life appears is to take care of, to safe all these structures from destroying.

The Earth was their mother long ago, and cells couldn't help appearing on the ancient Earth. So, there is the logic chain (indirectly proved) one terminus of which started in gases of initial Earth's atmosphere and other terminus, through all the events, is obvious for us, as we, all living one-celled and higher organisms are a part of this chain.

Every higher organism – plant, animal – consists of a great number of cells, which are located specifically. That is why forms of organisms are diverse and stable. The reasons of form diversity are being studied on the base of positional information (Volpert, 1982), at the level of cell interactions (Bouren, 1994) and role of genetic factors (Bonner, 1968; Neifah, Losovskaia, 1984; Gilbert, 1993). The thought that zygote or any isolatedly divisible cell has the information about the origin of higher organisms is very attractive.

It is known, that genes carry the information about the sequence of aminoacids in proteins. But, how form of organ, its location and time of formation is coded? The form selfformats all over again from the material given by genes. But, genes don't determine location and time of cells genesis. Genic and above-genic factors caused the process of selfformation. Functions of above-genic factors don't reveal themselves in separate cell, but in cell population, where cells are locally differentiating and create organs.

Formation of higher organisms is based on realization of six laws of development.

The first law: „Only the cells with strong adhesion after their division can form populations where the cells are locally differentiating”. Adhesion is universal law for all higher organisms. Since adhesion reveals itself at the first division of cell, e.g. zygote or any other cell of higher organism, and adhesion „supposes” the presence of protein, we can consider that adhesion is genetically determined property. It is interesting and mysterious that all the higher organisms are able to prevent adhesion of gametes during their formation. Haploidy of gametes doesn't play any role. On appropriate culture medium, haploid cells create the whole higher organism.

The second law: „The cells that are able to form multi-layer populations of tightly-arranged (tightly-packed) cells are creating higher organisms”. This law is the first step in hierarchy of the laws of selfformation. The creatures organizing fiber and laminar populations with small number of cells (alga, etc.) cannot create higher organisms. Genes and their products don't determine directly the number of cells in population.

The third law: „Embryonal cells are accumulating in populations as much as critical number of cells”. Critical number of cells (CNC) limits even growth of population in three directions. Having reached CNC, population determines cells destiny according to their location. As the previous law, the third law is based of genic and above-genic factors and it works in population as soon as the conditions of the first and second laws are fulfilled.

The fourth law: „Only population with critical number of cells creates the gradient of external factors over its radius”. This law shows brightly cell interconnection. The cells inside the population have other destiny than outlying cells. Protoplasm of internal cells is being lyzed due to activation of hydrolytic enzymes.

The fifth law: „The population with critical number of cells differentiates cells locally”. According to this law, tissues are being formed and located through diameter of population. In this law functions of genetic factor especially reveal themselves in the process of selfformation: genes that gave hydrolytic enzymes determine the destiny of cells; though these enzymes were synthesized neither for local differentiation nor for tissue formation.

The sixth law: „While contacting with differentiated cells, embryonal cells get metabolites, orient their division and form organs”. This law is purely morphogenic. These six laws logically delimit uninterrupted course of organisms selfgenesis.

It started with matrix activity of zygote DNA, included all the stages of metabolism. Cells are dividing and creating populations where cells behave themselves by the rules of six laws. (Fig. 1).

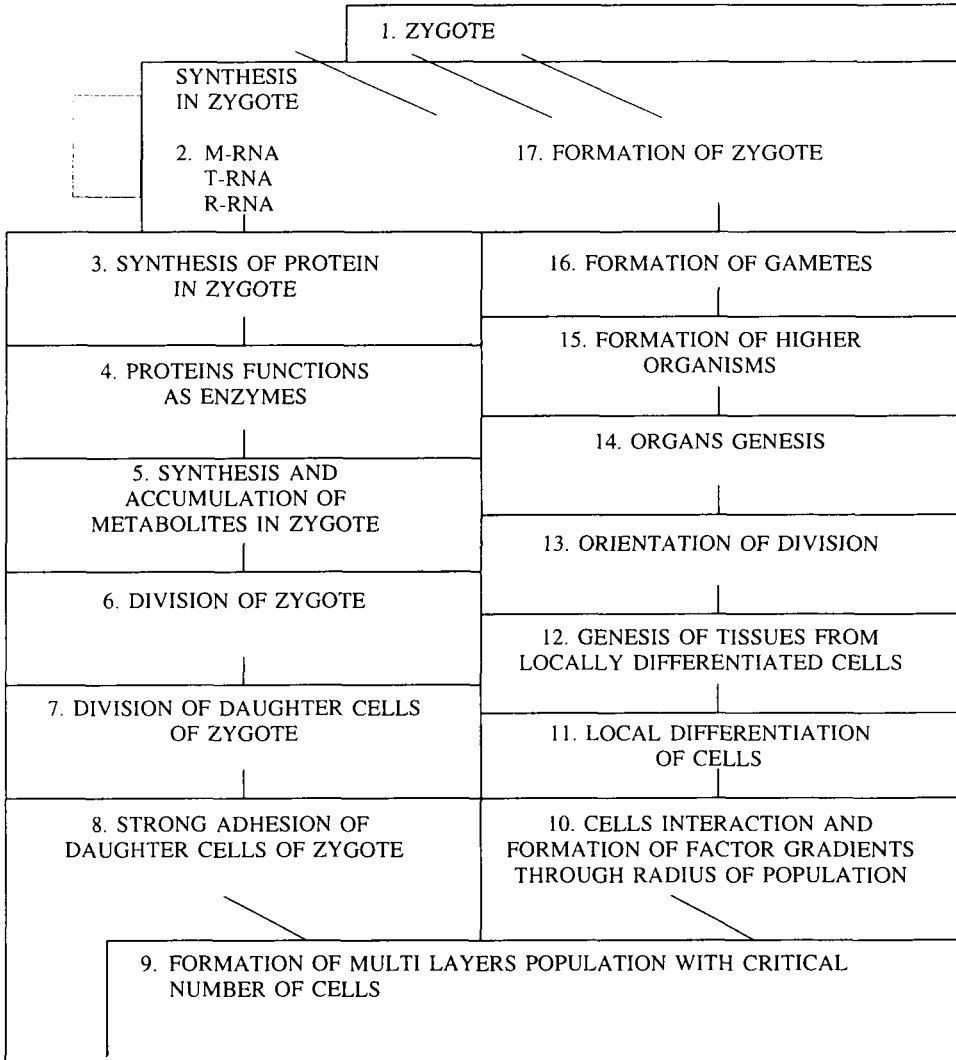


FIG. 1. Model (cycle) of selfformation of organisms
(Cycle of V.M. Buren)

D. Watson and F.Creek (1953) found the first links of the model (1–3). It took next 45 years to include in this model classical links of biology (4–7) and latest approaches (8–15).

The model is modern, has new characteristics – critical number of cells and their location, gives the opportunity to use mathematical methods in decoding form reasons.

And what about man? Man was created as every other organism according to the model. Human cells have formed independently, not later than one billion years ago. Those cells, having original human genome, were living as one-celled organisms and only 2–3 mln years ago (more likely, much earlier) they could make a creature who was a man at once. Other forms of creatures that looked like human beings appeared from their abiogenously synthesized cells. Man didn't have higher progenitors, excepting progenitors – man. The volume of brain, its weight and ability to think were given at the moment of genesis of human DNA. Unexpectedly, man was born perfect – with two legs, with large and smart head, etc. And here, man is as any other creature. All of them were perfect and beautiful.

Were dinosaurs ugly? No, they were peculiar, unique, ferocious, inspiring fear and... secret desire to meet them on a forest path.

Certainly, it is strange and uncomfortable to think, that the first people, appeared from masses of human cells, didn't have mothers, fathers. They were crying, starving, wallowing naked on the sand; nobody babied them through all the years. We are sorry for the first babies!

Looking at the test-glass with potato plant that appeared from the group of cells we are slightly surprised, but are not touched. We are interested in watching the development of tadpole he bravely solves his problems – he wants and will live!

And the first people, as all, were solving their problems. That was the way of man genesis by new logic. Certainly, Darwin's theory of man selfformation seems to be more attracting and mild. By this logic, Nature, Biosphere tried to create a man. Organisms were evolving and, by a chance, came across a man.

According to our logic, a man didn't have any advantages over other creatures on the way of his selfformation. So, Nature all at once, unconsciously created in DNA of cells a great number of organisms forms. But only three billion years later, it became obvious what „was planned” at once.

It is amazing that Nature, using the method of selfformation, has solved the problem of creating cells and higher organisms in a simple and mysterious way.

REFERENCES

- BONNER J., *Development. J. Biochemistry of plants*, M. „Mir” 1968, p. 520–530.
BUREN V.M., *Genesis of one-celled and higher organisms*, SPb. 1994, p. 33.
VOLPERT L., *Morphogenesis in the process of development. J. Molecules and Cells*, M. „Mir” 1992, p. 115–133.