

# Quantum Transfer as a Mechanism of the Mutation In Vivo

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A large number of results obtained by many researchers and by us made it possible to model the results to carry out the analysis according to the method of dialectics “Cause $\leftrightarrow$ Consequence”.

A diversity of numerous agents was analyzed as tools for studying biological processes *in vivo*. As a result turned that these agents of different nature (physical, chemical, biological, etc.) have a single, common action vector – energy (E) that interacting with the time parameter (T), defines the concept of the dose (D=ET) and this dose causes the biological process *in vivo* with two processing forms: 1)  $E = \cos t f(t)$  and 2)  $T = \cos t f(E)$ .

Studying of the biological process with full kinetic (min-max-min) *in vivo* by the method "dose-effect" revealed the following regularities: discreteness, continuity, homogeneity, heterogeneity, relativity, discontinuity, abruptness and spontaneity that characterize biological processes *in vivo* and the dose, causing this process *in vivo* in the organism. Besides these regulations provide the link between the processes occurring in the organism and between organisms *in vivo*, correlation interrelation between genotype and phenotype of the processes occurring in the organism and processes of morphological changes in the same organism *in vivo*. The phenomenon of correlations and these regularities that characterize the dose and biological processes is a sufficient and necessary factor to approve the “quantum theory” of Шредингер, 1947” that the mechanism of the biological process *in vivo* has a physical nature, which is implemented by the transition of quantum to the biological material.

For centuries and up to now researches of biological processes in different organisms (mutation, morphological changes, physiological, etc.) have been and are being conducted, starting with microorganisms and ending with the highest *in vivo*, using as an instrument of studying the agents of different nature (physical, chemical, biological, etc.) with dose dependence (Ауэрбах, 1978, Mild D., 1984, Алиханян С. И. 1968, Надсон Г.А., Кудрявцев В. И. 1927). However, in general the analysis of results obtained in these studies are inferior and unreliable due to the lack of study of the biological process as a whole (with full kinetics frequency rates min-max-min) which does not correspond with the laws of dialectics.

Therefore, conclusions of the analysis of these results are unreliable and inferior (Петров Д.Ф. 1958, Mondd J. 1970, Балаика А.Д. 1971). And therefore increase in the number of such works, year after year

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leads to an increase of many problems in biology, medicine, agriculture, etc. (Ауэрбах Sh. 1978). It is known that the solution to these problems is mainly determined by the identification of the essence of the mechanism of the biological process (Inge-Vechtomov, 2005). And therefore it is necessary to pay attention to some other mechanism, such as "quantum theory", which was offered by E. Шредингер in 1947 (Петров, 1958, Тимофеев-Ресовский, 1966, Mondd J. 1970, Намиот Б. 2014).

Solving these problems is mainly connected with the use of methodological aspects in accordance with the laws of dialectics, which are modeling of results and analysis of these results by the method of "Cause↔Consequence" (Трютиков Е.Ф. 1970, Базаржев А. 1988).

Bearing that in mind, we are making changes having following conditions:

1. "dose-effect" was chosen as a study method;
2. as a learning tool we use agents of different nature (physical, chemical, etc.);
3. mainly the micro-organism in which biological process (mutation) can be studied, taking place inside the organism and as well as processes of morphologic changes of cell normally having a homogenous shape (pic. 1) in morphology served as a test-object of study;
4. cause process of complete kinetics, i.e the process of frequency rate min-max-min (fig. 1);
5. use the method of modeling results for the organisms *in vivo* obtained by us and other researchers to analyze them according to the "Cause↔Consequence" method.

I. before the start of experimental work let's pay attention to the action of various agents (physical, chemical) their concentration of irradiation intensity. Since agents of different nature their concentration (C) and intensity of irradiation (I) cause the same biological process in the organisms *in vivo*, they have a single vector of actions which can be only the energy. Therefore in the study it is used as a common vector of action ( $E_C, E_I$ ).

II. to get a biological process with complete kinetics with frequency rate (min-max-min) experiments were conducted by the method of "dose-effect" with two forms of processing (fig. 1).

a) we received biological process with complete kinetics (min-max-min) with frequency rates  $F_{0min}-F_{2max}-F_{4min}$  (fig.1) by the influence of a certain time size ( $T=cost$ ) and energy interval [ $E_{c0}-E_{c4}$ ] or [ $E_{I0}-E_{I4}$ ] energy interval caused by the concentration (C) or irradiation intensity (I) of agents of different nature (chemical, physical), i.e.  $T=cost$  and  $f(E_C)$  or  $f(E_I)$ ;

b) we received biological process with complete kinetics (min-max-min) with frequency rates  $F_{0min}-F_{2max}-F_{4min}$  (fig.1) by the influence of a certain energy size ( $E=cost$ ) caused by the concentration ( $E_C=cost$ ) or intensity ( $E_I=cost$ ) and time interval [ $t_0-t_4$ ], i.e.  $E_C=cost$  or  $E_I=cost$   $f(t)$ .

The results showed that the same biological process with complete kinetics (min-max-min) in organism *in vivo* is caused independent from the processing form, which demonstrates that the biological process caused by the influence of a single, common factor which is the result of cooperation between the two parameters: energy and time, that is expressed by the concept of dose ( $D=ET$ ).

It became convincing (fig. 2) when the biological process with complete kinetics (min-max-min) for two forms of processing 1)  $E=cost$   $f(t)$  and 2)  $T=cost$   $f(E)$  is causes by equal frequency rates  $F_0=F_0'$ ;  $F_1=F_1'$ ;  $F_2=F_3=F_3'$ ;  $F_4=F_4'$ ; with the influence of appropriate doses  $D_0$ ;  $D_1$ ;  $D_2$ ;  $D_3$ ;  $D_4$ , caused by  $T=cost$   $f(E)$  or  $E=cost$   $f(t)$ .

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These actual results, confirming that the dose is the result of two parameters: energy and time ( $D=ET$ ), were subjected to deeper analysis according to the law of dialectics “Cause $\leftrightarrow$ Consequence” with two directions, which allowed to identify patterns both in relation to doses, and in relation to the processes.

III. a) Particular size of the dose [ $D_0$ ;  $D_1$ ;  $D_2$ ;  $D_3$ ;  $D_4$ ] (fig. 1) causing biological process specific frequency rates ( $F_0$ ;  $F_1$ ;  $F_2$ ;  $F_3$ ;  $F_4$ ) demonstrates that the biological process, as well as the dose have a discrete character;

b) Different dose sizes  $D_0$ ;  $D_1$ ;  $D_2$ ;  $D_3$ ;  $D_4$  of the interval [ $D_0$ -  $D_4$ ] (fig. 2), causing the same process, are homogeneous with respect to the process, and heterogeneous with respect to different frequency rates of the same process.

c) The same process, caused by dose interval [ $D_0$ -  $D_1$ ] with respect to different dose sizes of this interval is homogeneous, and heterogeneous with respect to different frequency rates of the same process.

d) Fig. 1 and 2 show that biological process with complete kinetics (min-max-min) with frequency rates  $F_0$ ..... $F_1$ ..... $F_2$ ..... $F_3$ ..... $F_4$  in fact, is continuously caused by influence of continuous sizes of doses  $D_0$ ..... $D_1$ ..... $D_2$ ..... $D_3$ ..... $D_4$ , which demonstrates that the dose as well as biological processes are continuous, which cannot be subjected to experimental study, and is a result of logical thinking.

IV. Of particular interest is the analysis of the results obtained in the study of biological processes with complete kinetics (min-max-min) for example, various biological processes (A, B, C) occurring in the same organism *in vivo* that gives an opportunity to identify regularities of relationship between these processes.

a) Fig. 3 shows that separate processes A, B, C with complete kinetics (min-max-min) in the same organism are taking place under the influence of interval dose [ $0$ - $D_1$ ]; [ $0$ - $D_2$ ]; [ $0$ - $D_3$ ] discretely.

b) A continuous increase in the number of dose intervals [ $0$ - $D_1$ ].....[ $0$ - $D_2$ ].....[ $0$ - $D_3$ ] leads to a continuous increase in the number of the causing process (A, B, C), that is biological processes are continuous in nature.

c) Different dose size intervals [ $0$ - $D_1$ ] < [ $0$ - $D_2$ ] < [ $0$ - $D_3$ ], causing various biological processes with complete kinetics (min-max-min) in the organism provide alternation of these processes  $A \rightarrow B \rightarrow C$

d) In fig. 3 if to pay attention to the certain size of dose ( $D_0$ ) close to zero, in which different biological processes A; B; C are being induced, these processes take place at the same time by different rates of frequency  $F_A$ ,  $F_B$ ,  $F_C$ . This means that dose ( $D_0$ ) has relative and heterogeneous nature with respect to these processes. And these processes A; B; C in their turn being caused under the influence of the certain value of the dose ( $D_0$ ) are characterized by heterogeneity and relativity.

On the basis of these data we can conclude that these regularities: discontinuity, continuity, heterogeneity, homogeneity, relativity and alternation of the biological processes and doses provide interrelation between processes occurring in the organism. Interrelation between organisms which can be revealed by a study of a certain biological process in different organisms – A, B, C (fig. 3) is caused by the same regularities.

V. Interrelation of interaction of two parameters of dose ( $D=ET$ ) has essential value when inducing biological process in organism *in vivo*. A parameter of dose – energy as a general vector of different agents' action (chemical, physical etc.) with different concentrations (C) and irradiation intensities (I) and with different sizes of energy can be presented respectively  $E_{c1} > E_{c2} > E_{c3}$  and  $E_{i1} > E_{i2} > E_{i3}$

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a) The results obtained by “dose-effect” method in picture 4 show that under the influence of certain sizes of the parameters  $E_{c1}=\text{cost}$ ;  $E_{c2}=\text{cost}$ ;  $E_{c3}=\text{cost}$  and  $E_{11}=\text{cost}$ ;  $E_{12}=\text{cost}$ ;  $E_{13}=\text{cost}$ , which make by value decreasing sequence on the one hand and increasing sequence on the other hand:

$$\infty \leftarrow E_{11} > E_{12} > E_{13} > \dots > E_{c1} > E_{c2} > E_{c3} \rightarrow 0$$

induce a biological process with complete kinetics (min-max-min) changing the time interval  $[o-t]$ , during which the process *in vivo* occurs, on the one hand energy increase decreases the time interval, on the other hand energy decrease increases the time interval, i.e. the time interval of the occurring process has speed (V):

$$o \leftarrow [o-t_1] < [o-t_2] < [o-t_3] < \dots < [o-t_4] < [o-t_5] < [o-t_6] \rightarrow \infty$$

Time interval approaches zero  $[o-t] \rightarrow 0$  when energy size infinitely increases ( $E \rightarrow \infty$ ), wherein biological process *in vivo* takes place spasmodically, and on the other hand time interval approaches infinitely  $[o-t] \rightarrow \infty$  when energy size approaches zero ( $E \rightarrow 0$ ), wherein biological process *in vivo* takes place spontaneously.

These actual existing properties, spasmodic and spontaneity, being origins of the biological process *in vivo*, cannot be subjected to experimental study, since they are the result of logical thinking.

VI. Based on the fact that phenotype and genotype processes are of special and important interest in cognition of the essence of mechanism of the biological process (Надсон Г.А. 1927), we carry out a study of the process of morphological changes by “dose-effect” method like the study of biological process taking place in the organism *in vivo* using the same conditions of study.

- a) Under the influence of dose morphological changes were induced in microorganism, cell suspension of which was in norm being homogeneous (pic. 1). These cells were changed under the influence of dose and became big and round (pic. 2), rod-shaped (pic 3) undividable cells. Every single one of these changes occurs as a process with complete kinetics (min-max-min) under the influence of dose interval  $[D_0-D_4]$  (pic. 1, 2), and for different changes in the morphology (A, B, C) of the respective dose interval  $[0-D_A]$ ;  $[0-D_B]$ ;  $[0-D_C]$  (pic. 3)

Wherein analysis has revealed that the process of the morphological changes, as well as the biological process have all the regularities occurring in the organism *in vivo*: discontinuity, continuity, homogeneity, heterogeneity, relativity, abruptness, spontaneity and alternation, besides they provide interrelation between the processes of morphological changes (big circle cells – A → rod-shaped – B → undividable cells - C) caused by dose ( $D=ET$ ) (pic. 3).

VII. Based on the fact that the key of revealing the mechanism essence is interrelation between the processes of phenotype and the processes of genotype [Inge-Vechtomov, S. G. -2005], we had to study it by the “dose-effect” method keeping strictly the processing conditions in which mutational processes and processes of morphological changes *in vivo* were taking place at the same time. (pic. 5, 6)

- a) Inducing certain mutational process (for example mutations of amino acid  $\text{leu}^- \rightarrow \text{leu}^+$  - A;) and process of morphological changes (forming of big round cells - a) with complete kinetics (min-max-min) in microorganism *in vivo* (pic. 5) we found that these two processes take place with complete kinetics (min-max-min) with the general interval influence of dose ( $D_0-D_2$ ) (pic. 5) at the same time simultaneously taking frequency rates  $F_{\min}f_{\min} - F_{\max}f_{\max} - F_{\min}f_{\min}$  in doses respectively  $D_0-D_1-D_2$  of this interval. These results evi-

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dence that there is a straight correlation connection between biological mutational process ( $leu^- \rightarrow leu^+$  -A) occurring within the organism *in vivo* and process of morphological changes – a of this same organism.

b) A deep study of this phenomenon, of the correlation by the “dose-effect” method in the same conditions of the processing has revealed that alternating different mutational processes ( $leu^- \rightarrow leu^+$  - A;  $arg^- \rightarrow arg^+$  B,  $lys^- \rightarrow lys^+$  -C) (pic. 6) and alternating different processes of morphological changes (forming of big round –a, → rod-shaped – b → undividable cells - c) pass by the dose interval actions at the same time respectively [ $D_0-D_1$ ]; [ $D_0-D_2$ ]; [ $D_0-D_3$ ] (pic. 6) in the same organism for which mutational process – A is correlated with the process of morphological changes – a, mutational process – B is correlated with the process of morphological changes – b, mutational process – C with the process of morphological changes -c accepting at the same time min-max-min frequency rates from the same organism *in vivo*. Stating the results obtained by the analysis according to the law of dialectics (reason ↔ consequence) we get: energy (E) as a single vector characterizes all the agents of different nature, different concentrations and radiation intensities differing by size which is one of the parameters dose action ( $D=ET$ ). And dose in its turn is a result of interaction of two parameters energy and time ( $D=ET$ ) with the help of which a number of regularities are found characterizing both dose and biological process: discontinuity, continuity, homogeneity, heterogeneity, relativity, alternation, abruptness and spontaneity and phenomenon of correlation as interrelation (interconnection) between the process of genotype occurring in the organism and the process of phenotype (morphological changes) *in vivo*. All these are necessary and sufficient conditions for the approval of the “quantum theory” (Шредингер, 1947) that mechanism of the biological process *in vivo* having physical nature represents a quantum transition in the biological material *in vivo*. This quantum theory has developed insensibly (Тимофеев-Ресовский Н.В., Иванов В. И.) and is developing up to nowadays (Inge-Vechtomov, 2005, Namiot, 2014, Dvordjev Y.B., 2014; Dvordjevic Y.B., Markov 2014, Mekikh A.V., 2015; J. Me Fudden, J. Al. Khalili, 1999).

It is hoped that such mechanism of biological process with its regularities has been subjected to a deep study and leads to directed solving of the emerging problems in biology, medicine, agriculture and etc.

## References

- [1]. Алиханян С.И. «Некоторые вопросы механизма индуцированного мутагена в кн. Экспериментальный мутагену животных, растений и микроорганизмов», тезисы докладов, стр. 25-50, 1965;
- [2]. Алиханян С.И. Лекция промышленных микроорганизмов «Наука» 1968, стр. 39-392;
- [3]. Алиханян С.И. «Молекулярный механизм мутагена в современной генетике», 1967, стр. 195;
- [4]. Аэрбах Ш. «Проблемы мутагенеза», изд. «Мир», 1978, стр. 465
- [5]. Базржев, «Проблема причинности в генетике», автор дис. Наука, М, 1988, стр. 16;
- [6]. Болика А.Д. «Методологические проблемы мутационной концепции», автореферат дис. на соис. уген. степ. Философ. Наук, М., 1971, стр. 20;
- [7]. Надсон Г.А. «О действии радия на дрожжевые грибки в связи с одной проблемой влияния радия на живое вещество», II Вестник рентгенологии и радиологии, 1920 I 1, стр. 45-317;
- [8]. Надсон Г.А., Кудрявцев В.И. «Об амёбообразной форме клеток у дрожжей, передаваемой по наследству», II Микробиолог. жур. 1927, I 5, стр. 165-168.
- [9]. Надсон Г.А., Рохлина Э.Н., «О поле действия, поле смерти и биологической дозиметрии», II Вестник рентгенологии и радиологии, 1934, Т. В. 1-2, 23-34;

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- [10]. Намиот В. А. «Многомировая интерпретация квантовой теории и фундаментальные проблемы биофизики», Биофизика, 2014, том. 59, вып. 1, стр. 202-208;
- [11]. Петров Д. Ф., «О некоторых философских вопросах учения о материальных основах наследственности», II, вопросы философии, 1958, N 7, стр. 102-112;
- [12]. Тарасов В.А. «Молекулярный механизм репарации мутагена», М. изд. «Наука», 1982, стр. 226;
- [13]. Тимофеев-Ресовский Н.В., Иванов В.И., Глотов Н.В., «Некоторые вопросы радиационной генетики», II, Актуальные современной генетики, М., 1966, стр. 412-433;
- [14]. Тюрютиков Е.Ф., «Некоторые методологические аспекты в изучении наследственности», II, Науч. труд. Рязанского мед. инст., 1970, I 29, стр. 318-335;
- [15]. Шредингер Э. «Что такое жизнь с точки зрения физики», М., 1972, стр. 88;
- [16]. Crick F.H., Barnett I., Brenner B., Watts-Telin R.I. «General Nature of the Genetic Code for Proteins», N., Nature, 1961, Vol. 192, p. 1227-1232;
- [17]. Freeze F. «Molecular Mechanism Mutations, Molecular Genetics», 1963, Part 1, Ch. V. 2 ed;
- [18]. Mondd I. «Hasard et Necessite sur la philosophie naturelle de fiologie modern», Paris, 1970;
- [19]. Inge-Vechtomov S. G. «Abstracts papers by young scientists», Yerevan, September 8-11, 2005, p. 35;
- [20]. Mild D. «The Sperm morphology test a rapid in vivo for germinal mutations», Bga-Schr. Inst Veteriner mod sundesges undheit sant, 1984 N 3, p. 299-306.
- [21]. Dvordjevic Y.B. Quantum information Processing and Quantum Error Correlation, Elsever. Amsterdam, The Netherland Academic Press, Boston M.A. USA, 2012.
- [22]. Dvordjevic Y.B., Markov, Chain-like Quantum Biological Modeling of Mutations, Aging and Evolution, Life (Basel) 2014, Sep., 5(3), 1518-1538.
- [23]. Mekikh A.V.E., Nonlinearity of Quantum mechanics and of the problem of wave function, Commun, Phys, 2014, 47-64.
- [24]. I. Me. Fudden J. Al. Khalili, A Quantum mechanical model of adoptive mutation Biosystem, 50 (1999), 203-211.

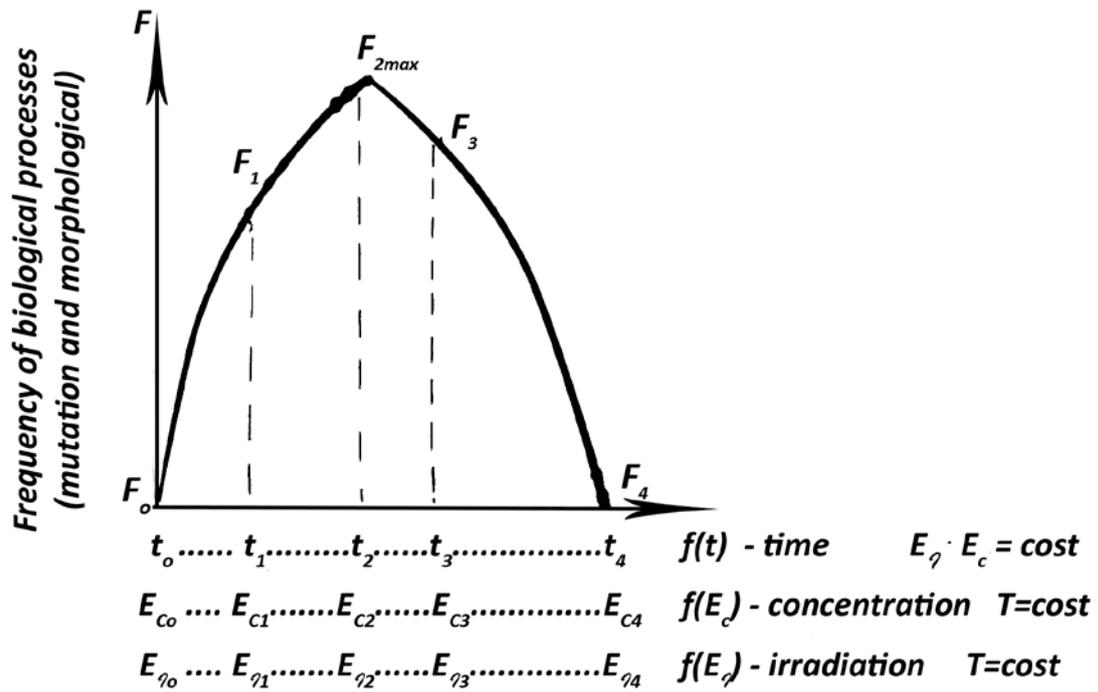


Fig. 1

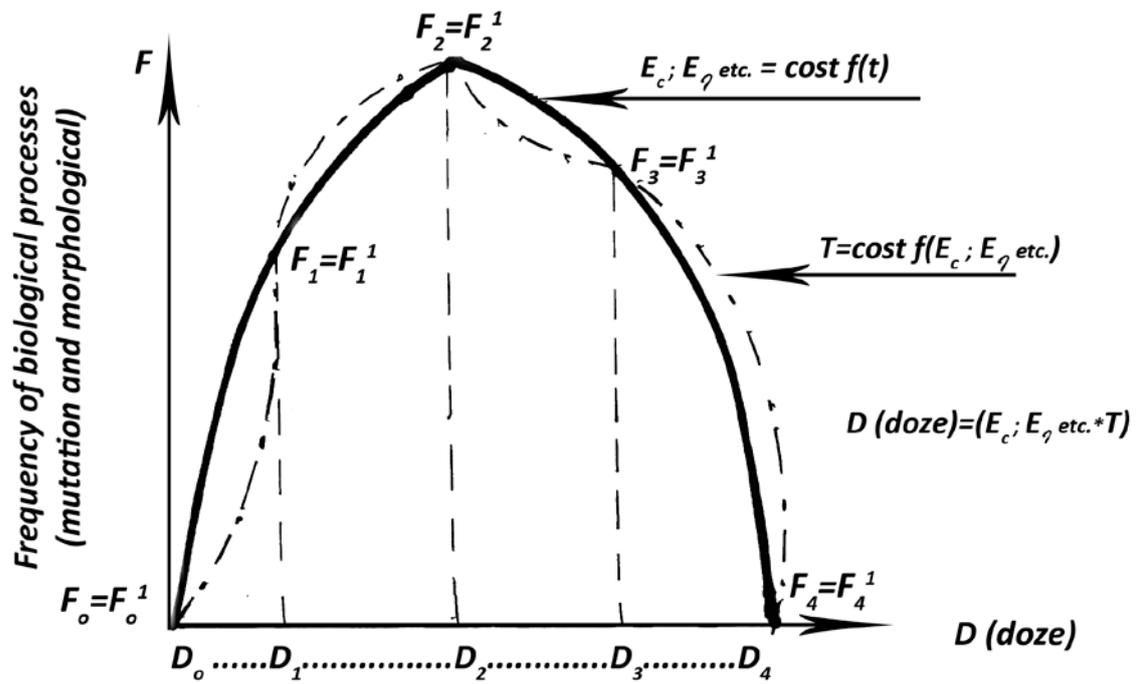


Fig. 2

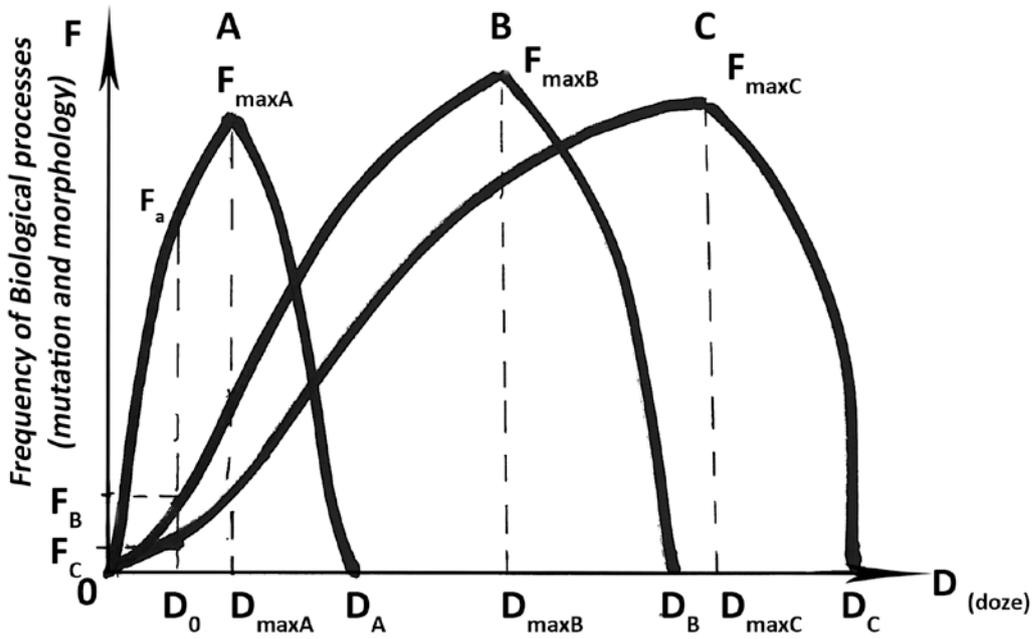


Fig. 3 [0 -  $D_A$ ] . . . . . [0 -  $D_B$ ] . . . . . [0 -  $D_C$ ]

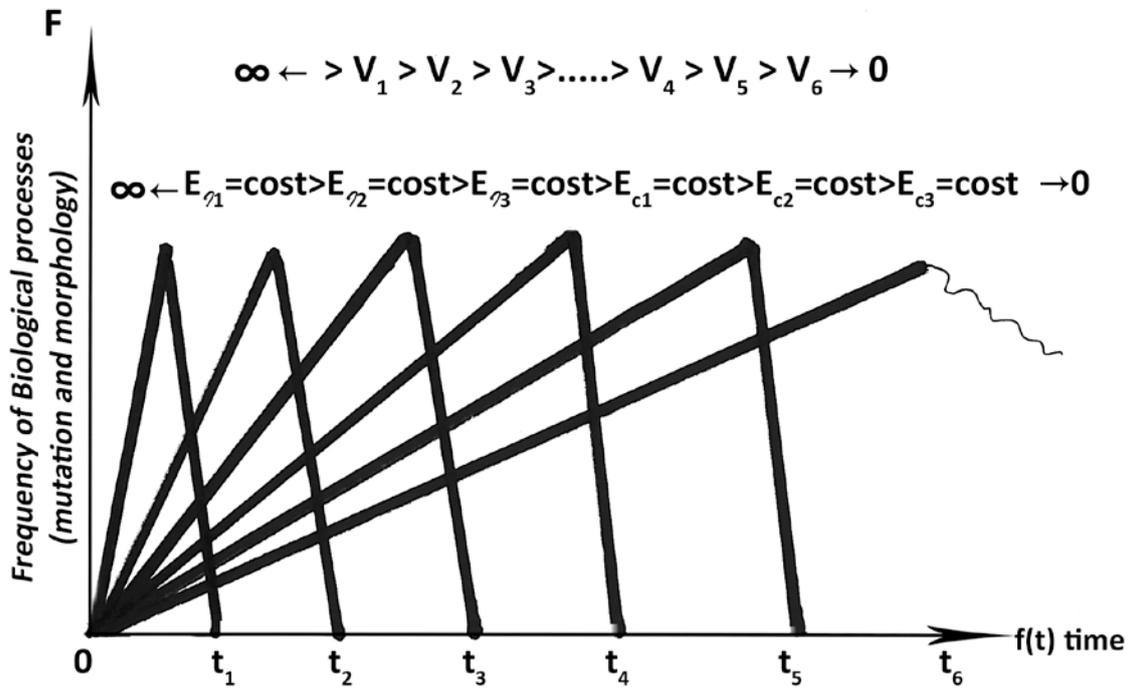


Fig. 4

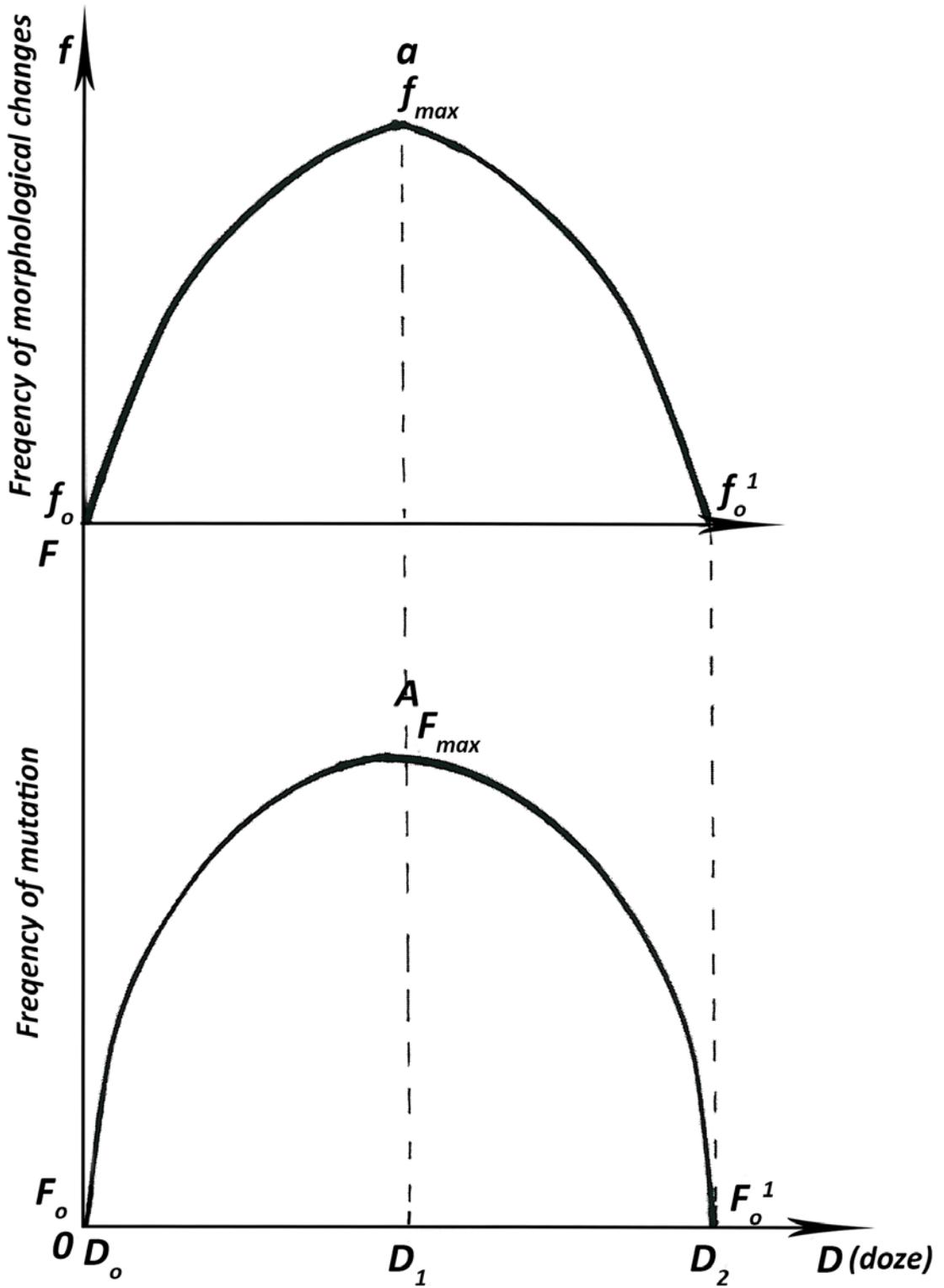


Fig. 5

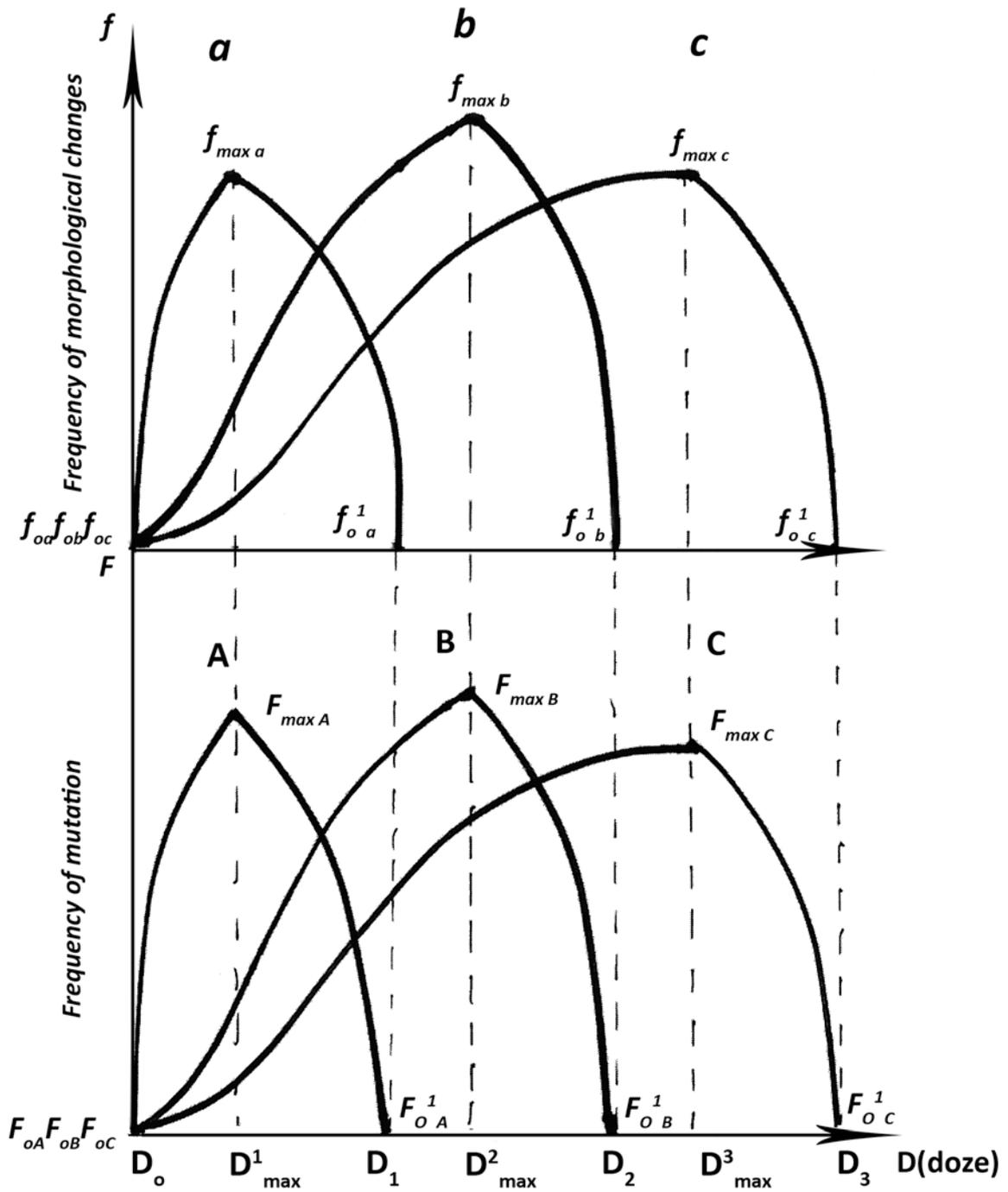
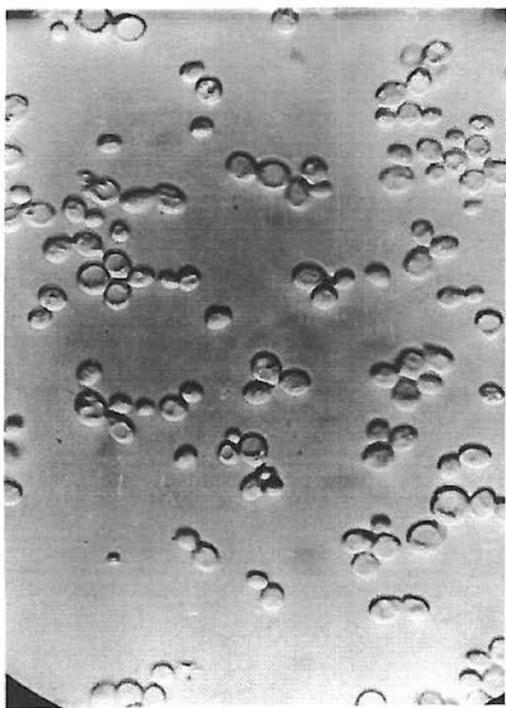
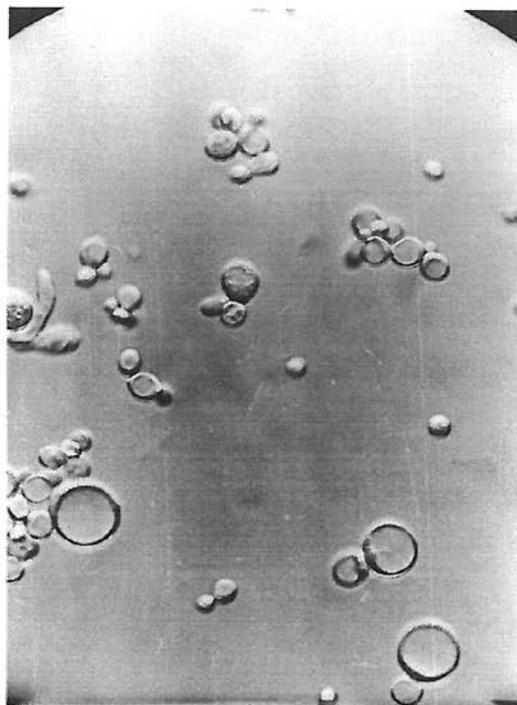


Fig.6

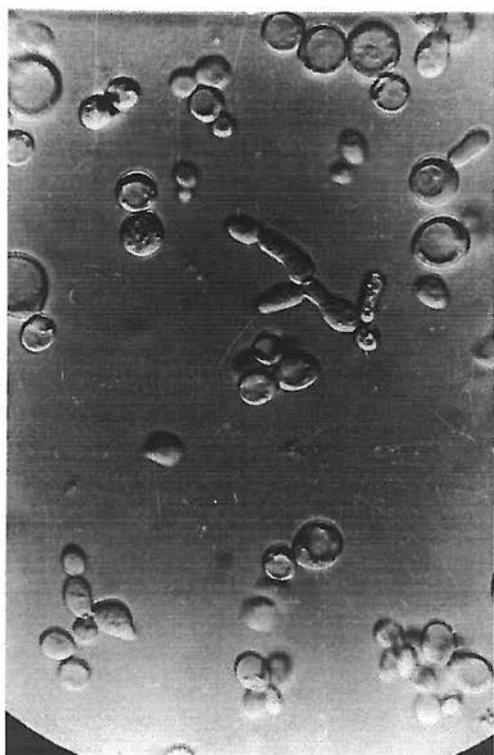
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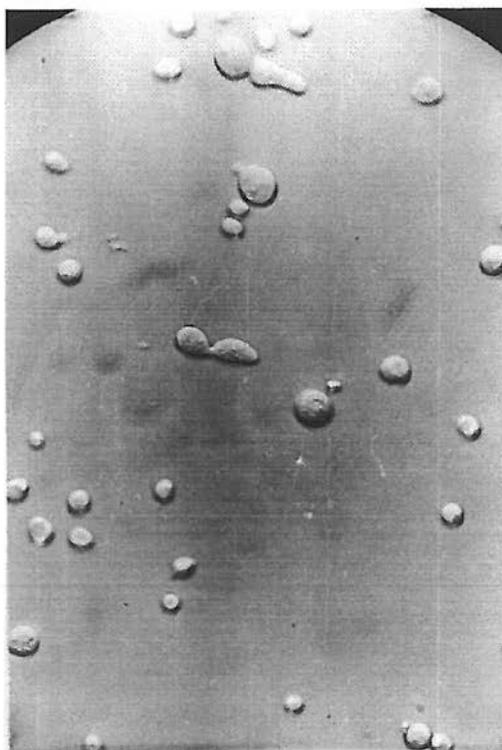
Pic. 1



Pic. 2



Pic. 3



Pic. 4