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Possibility of Activated Time Dimension Effects on Rate of Redox Reaction and Growth Rate of Tissue Culture Plants

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ABSTRACT

The activating process of the time dimension by the arrangement of electrolytic capacitors along the resultant time vectors under a magnetic field was investigated. After completion of the activation process, the investigation aimed to find out influences on the rate of chemical reaction and growth of tissue culture plants under a time-field compared to the blank. The experiments showed an average increased rate and an average decreased rate of the redox reactions in a positive time-field and a negative time-field, respectively. Furthermore, the positive time-field resulted in an average of 10.11 and 11.44% increased growth rate of callus culture plants of carrot (*Daucus carota* subsp. sativus) and African violet (*Saintpaulia ionantha*), respectively.

Keywords: Arrhenius equation, frequency factor, growth rate, time dimension, time-field, time vectors

INTRODUCTION

Generally, at present, "time" is most familiar as a scalar quantity. However, mathematics is a precision tool for solving physical phenomena, so that "time" has been proven mathematically to be a vector (Boonsri, 2002), given a time dimension. The proof demonstrated that the geometry of the time dimension is the result of time vectors which are composed in the shape of a pyramid with a specific ratio of the height to the base (Boonsri, 2003). The specific ratio pyramid is called the "time dimension".

However, the time dimension is still not useful, unless it is activated. The activated time dimension should influence all scientific phenomena that have a time relation. The application of an activated time dimension should profit science if it is applied to everything that involves time. Thus, a practical test in the laboratory must be conducted to investigate any effects.

In any testing, the activated time dimension should be investigated for effects on both the rate of chemical reactions and the growth rate of living organisms, such as plants.

MATERIALS AND METHODS

Experiment 1: Chemical reaction

Activated process

A time dimension was created in a pyramidal shape with height 150 mm and base 300 mm made using paper. Discovery of the activation

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of the time dimension was determined as follows. Four triangular metal sheets were attached inside the four sides of the pyramid with a one-centimeter gap between them. Electrolytic capacitors of 16 V, 1,000 microfarads were placed along the four sloping edges. The arrangement of the electrolytic capacitors placed a positive pole of each capacitor on the upper direction of each declining sloping edge (Figure 1). The two poles of all electrolytic capacitors were bent to contract the metal sheets and each metal sheet was contracted using only the positive or negative poles of electrolytic capacitors. These pole arrangements resulted in the opposite sides of the metal sheets being positive and negative. The structure was placed on a ceramic plate with a cylindrical magnet of a speaker under the center of the plate. This structure is called a "positive time-field structure" (Figure 1a).

Another "negative time-field" was made using paper. The difference in this structure from the positive time-field was the opposite arrangement of the electrolytic capacitors, which placed a negative pole of each capacitor on the upper direction of each declining sloping edge (Figure 1b).

The time-field structure had to be activated before conducting the research. Activation involved leaving the structure stand without any disturbance for at least 10 d. (This period should be extended if the relative humidity is higher than 75%). After the activating period, research must only be carried out at the activating location.

A blank structure was also made using paper, similar to the time-field but without any electrolytic capacitors. The structure was also placed on a ceramic plate with a cylindrical magnet under the center of the plate. The activating process was carried out parallel to that of the time-field. The blank structure should be placed within 300mm of the time-field to make for any comparisons of reactions between the blank and the time-field.

Procedure

An investigation on any effect of the time-field on a chemical reaction depends on measuring a different rate of reaction between the time-field and the blank. Thus, a precise reaction time is a very important factor. Therefore, an iodine clock reaction was selected as the representative chemical reaction.

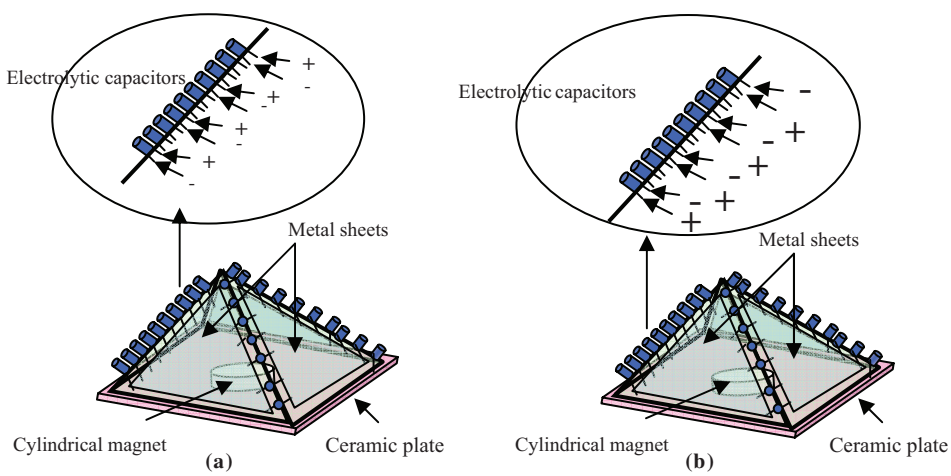

Figure 1 Positive time-field (a) and negative time-field (b).

A stock solution of iodine clock reaction was prepared by mixing 200 mL 0.2*M* $Na_2S_2O_3$, 80 mL acetate buffer, 80 mL 0.3 *M* KI and 10 mL starch solution. A solution of 0.10 *M* H_2O_2 was used for reacting to the stock solution. After the complete reaction, the solution turns blue.

Two homogeneous solutions were used to determine the rate of reaction in the time-field compared with the blank. The homogeneous solution was prepared by mixing 10 mL of 0.10 *M* H_2O_2 to 25 mL stock solution with 24 times transfer from one beaker to another beaker. Timing by a watch commenced when the two solutions reacted. After the homogenizing process was completed, equal amounts of homogeneous solution were transferred to the two beakers. This step had to be done carefully with checking for the homogeneity of the reaction to be complete within 7-9 min and only with one record. Because of room temperature differences during testing, it may be necessary to adjust the amount of 0.10 *M* H_2O_2 necessary, so that the reaction time will be in the range of 7-9 min.

The two beakers of homogenous solution were placed gently in the blank structure and in the positive time-field structure. Before the reaction was complete, the two structures were opened and timing stopped when the solution turned to blue. The time difference was recorded as the effect of a positive time-field. The reaction tests were performed every week until week 8. The results of three replications of the weekly test were averaged and are recorded in Table 1.

The experiment was conducted with a negative time-field as well as a positive time-field. The results of three replications of the test were averaged and are recorded in Table 2.

Experiment 2: Tissue culture plants

Before the experiment was started, the time-field and the blank were activated for 1 month in a plant tissue culture room. Fluorescent lamps were used to provide light (Figure 2).

Procedure

Carrot (*Daucus crota* L.) seeds were germinated in MS (Murashige and Skoog, 1962) medium without hormones for 8 w. The stems of the seedlings were cut to 1 cm length and then placed on MS medium containing 2 mg L^{-1} 2, 4-D for callus initiation. After 8 w, four calluses (0.5 cm in diameter) were transferred to a bottle of fresh callus induction medium.

African violet (*Saintpaulia* sp.) plantlets regenerated from leaf disc culture in MS containing 0.2 mg L^{-1} NAA and 0.1 mg L^{-1} BA were used as other plant material. A plantlet was transferred to a bottle containing fresh medium.

Table 1 Average reaction time and time differences of the iodine clock reaction in the positive time-field compared with the blank time.

Day of activation	Reaction time (min)		Time difference (s)
	Time-field	Blank	
0	0	0	0
7	8:46.56	8:49.70	3.2
14	9:39.82	9:43.92	4.1
21	8:20.85	8:24.25	3.4
28	7:54.94	7:58.04	3.1
35	8:35.68	8:37.98	2.3
42	9:46.73	9:49.73	3.0
49	9:51.76	9:56.44	4.7
56	8:17.81	8:22.11	4.3

Table 2 Average reaction time and time difference of the iodine clock reaction in the negative time-field compare to blank.

Day of activation	Reaction time (min)		Time difference (s)
	Time-field	Blank	
0	0	0	0
54	08:37.8	08:36.5	-1.3
89	08:55.4	08:50.7	-4.7
97	07:42.3	07:40.3	-2.0
100	07:57.8	07:56.4	-1.4
104	08:16.7	08:14.7	-2.0
115	08:12.9	08:10.5	-2.4
118	09:35.5	09:31.7	-3.8
119	08:43.4	08:40.7	-2.7
120	08:29.4	08:26.6	-2.8

A set of nine bottles of each plant material (carrot callus and African violet plantlets) was placed under the time-field and another set was placed under the blank. The fresh weights of both plant materials were measured at the beginning and the end of two months of the experiment. The experiment was conducted twice and the average weights are recorded in Table 3.

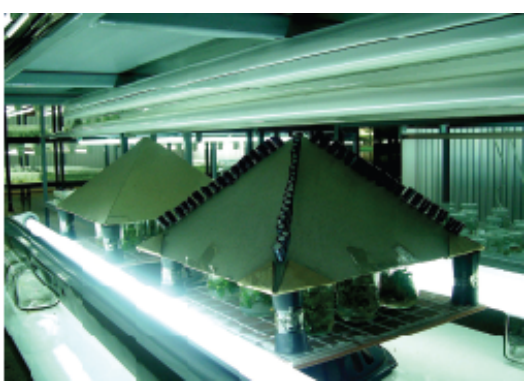

Figure 2 Nine bottles of plant material in the time-field (front) and the other nine bottles in a blank structure (rear).

RESULTS

Experiment 1:

The experiment with the positive time-field was started after 10 d of activation. The reaction was conducted every 7 d and produced an increase in the rate of the iodine clock reaction compared to the blank, as shown in Table 1. The rate increase ranged between 3.0 and 4.7 s in the 7-9 min reaction time (Figure 3(a)).

There were some fluctuations in the rate of increase, which may have been caused by unstable humidity during the period of 56 d.

The experiment with the negative time-field was started after 54 d of activation because more activation time was required than for the positive time-field. When the period was prolonged, the reaction seemed to be affected

Table 3 Average increase in fresh weight (FW) and % increase in fresh weight of carrot callus and African violet plantlets in a positive time-field compare to a blank.

Plant material	Increase in FW (g)		Different FW (g)	% increase FW (g)
	Blank	Time-field		
Carrot callus	1.8550	2.0426	0.1876	10.11
African violet plantlet	10.7374	11.9658	1.2284	11.44

more. However, the negative effect was reduced when the reaction was conducted frequently and humidity changes were involved. Nonetheless, all reaction rates decreased, ranging from -1.3 to - 4.7 s, with an average of -2.3 seconds (Figure 3(b)).

Experiment 2:

After two months of testing, the fresh weight of both the carrot callus and the African violet plantlets in the time field compared with the blank increased by 0.1876 and 1.2284 g, respectively, (Figure 4 and Table 3). The average percentages of increased fresh weight of the carrot callus and African violet plantlets were 10.11% and 11.44%, respectively.

DISCUSSION

Experiment 1:

The results of all positive effects in a positive time-field and all negative effects in a negative time-field cause difficulties in the Arrhenius equation (Equation 1), in which the rate of reaction depends only on the concentration and temperature:

$$k = Ae^{-Ea/RT} \quad (1)$$

The present research showed that the reaction rates of homogeneous solutions at equal temperature are affected by increment and decrement in positive and negative time-fields, respectively. These conflicts can be described by some theories involving the dilation of time in the time-field, as

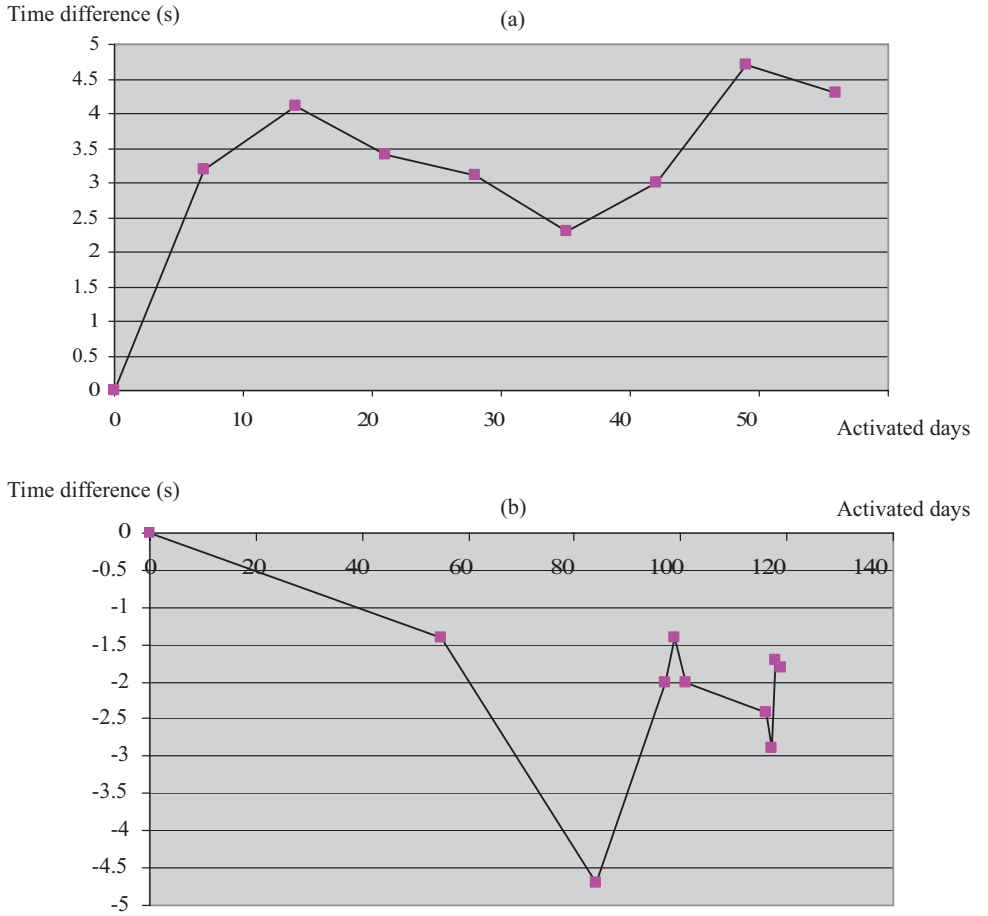

Figure 3 Reaction rate in positive time-field (a) and negative time-field (b) compared with the blank.

follows.

1. The collision theory:

Consider the factors of collision, Z (Equation 2) and A (Equation 3):

Collision frequency, $Z_{AB} = \pi\sigma_{AB}^2\sqrt{\frac{8k_BT}{\pi\mu_{AB}}}C_AC_B$ (2)

Frequency factor, $A = \pi\sigma_{AB}^2\sqrt{\frac{8RT}{\pi\mu_{AB}}}[A][B]$ (3)

Where:

σ_{AB} = the radius (collision cross section) of atom A and B,

μ_{AB} = reduced mass,

T = temperature,

C_A = molecule A / volume concentration of A and B,

C_B = molecule B / volume concentration of A and B,

[A] = molar concentration of A,

[B] = molar concentration of B,

k_B = Boltzmann constant,

R = gas constant.

The only cause of the different rates in the time-field compared with the blank is a difference in time between the two structures. It was expected that time would be faster in the positive time-field and slower in the negative time-field when compared with the blank. Suppose the time in the positive time-field is twice as fast as in the blank. If the time vector of the blank (T_B) takes 1.0 s to reach point "A", then the time vector of the positive time-field (T_T) reaches point "A" in 0.5 s, as shown in Figure 5. This makes the Boltzmann constant, k_B and the gas constant, R, change.

The unit of k_B is J/K and for R is J/mol.K. The energy unit of Joule is $kg.m^2/s^2$. Both units are related to a unit of time (the second). If 0.5 s is substituted for a phenomenon in the positive time field, while 1.0 second is substituted in the blank, then the energy in the time-field will become four times greater than the energy of the blank. This causes the increment of the k_B and R values in the positive time-field and increases the value of the collision factor, Z and of A. Then, the rate constant, k, of the Arrhenius equation should be increased by effects from the change of Z or A.

In addition, consider Equation 4, a swept volume of a molecule AB per unit of time (Δt).

Figure 4 Increased weight of carrot callus and African violet plantlets in a positive time-field compared with the blank.

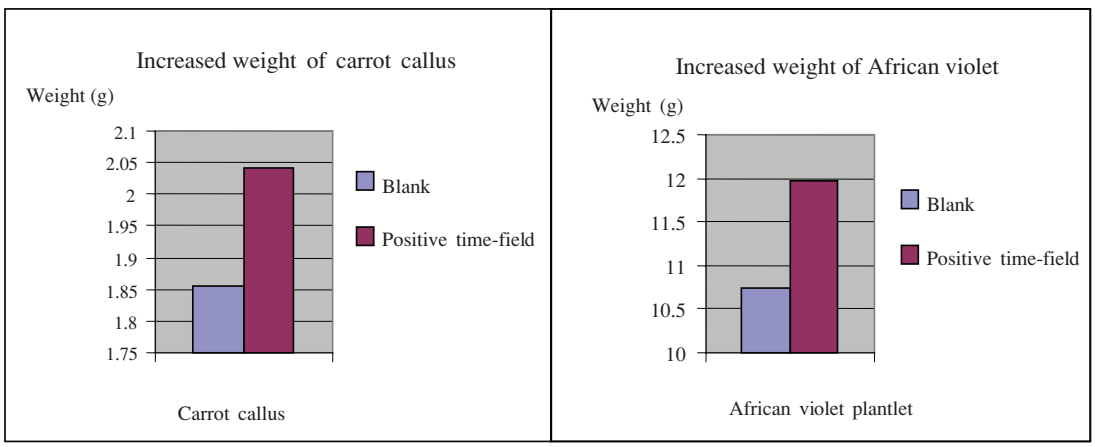

Figure 5 Increased weight of carrot callus and African violet plantlets in a positive time-field compare with the blank.

$$\Delta t = \pi\sigma_{AB}^{2}\sqrt{\frac{8K_BT}{\pi\mu_{AB}}}\,dt \qquad (4)$$

In the positive time-field, there is a longer distance of sweeping volume than in the blank due to time dilation. Then, the swept volume in the time-field is much greater than in the blank (Figure 5). The increased swept volume increases the chance of a collision between the AB molecules. This increases the value of the factors of collision and increases the rate constant in the Arrhenius equation.

The effect of a negative time-field, which decreases the rate of reaction, can be described as the reverse of the above.

2. Transition state theory:

The activation energy, E_a is a potential energy that acts as a barrier for atoms or molecules to react with each other. The reaction can only proceed when the system has gained enough energy to cross over the energy barrier (Figure 6).

In experiment 1, the positive time-field resulted in a higher energy, as described in the Collision Theory. It created a saddle point in the potential energy surface; meanwhile the R value also increased by an equal amount. Then, the ratio of E_a/R in the Arrhenius equation remained unchanged in the positive time-field. Thus, the increased rate is not due to an increase in energy, but is caused by an increase in the rate constant.

In thermodynamics, the rate constant of an activated complex is described by Equation 5:

$$k = \frac{k_BT}{h}\exp\left(\frac{\Delta s^*}{R}\right)\exp\left(\frac{-\Delta H^*}{RT}\right) \qquad (5)$$

Where: ΔS^* and ΔH^* are the entropy and enthalpy, respectively, of the activated complex at a transition state.

In parentheses, the entropy and enthalpy are the energy that changes over R. While these increases in energy are both of thermodynamic parameters, R increases too. This results in the value in parentheses remaining unchanged. So, at a constant temperature, the increment of the rate constant is only caused by the change of the Boltzmann constant that reasonable form effect in collision theory.

Experiment 2:

The reason for the increasing growth rate in plants may be similar to the redox reaction in the positive time-field that could increase the factors of collision. The factors of collision might enhance some redox reactions in the plant, such

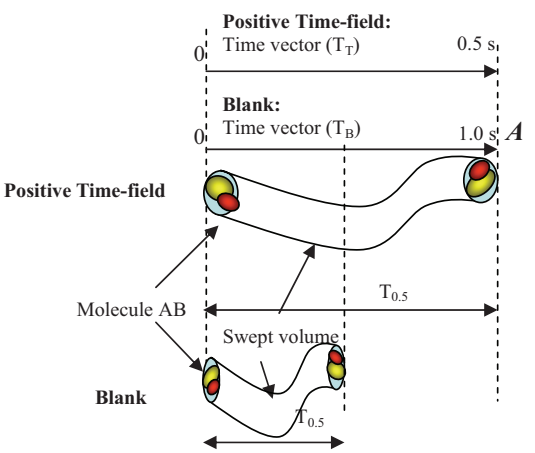

Figure 5 Different time vector and swept volume of molecule AB in the positive time-field compared with the blank.

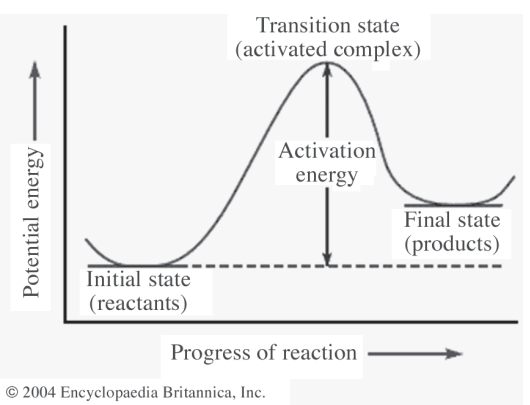

Figure 6 Relationship between potential energy and progress of reaction.

as electron transport in the light reaction of photosynthesis and accelerate collisions of ATP, $FADH_2$ and ADP to electrons in the mitochondrial membrane, causing higher production of ATP. However, by thermodynamics, the increase in the factors of collision results in an entropy change, ΔS, more positive that free energy, ΔG of the system more negative ($\Delta G = \Delta H - T\Delta S$). These changes lead to an increase in the potential of the work done in the photosynthetic and respiration systems that results in more products and finally, increase the growth rate.

CONCLUSION

The change of the rate of a chemical reaction is caused only by the frequency factor in the Arrhenius equation which is affected by the increase in positive time-field and the decrease in the negative time-field. Their directions are evidence for the possibility of supporting the existence of time vectors that can be composed to become a time-field. These two directions of change indicated that a practical proof of the time dimension as a vector is possible after activation. In addition, the time-field itself causes time dilations (both positive and negative), which are related to the nature of the opposite properties. Not only ordinary chemical reactions were affected, but also chemical reactions in living organisms.

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