

Effect of Dopamine, a Human Love Factor, on the Physio-Chemical Properties of Filamentous Green Alga: *Spirogyra*

Aishwarya Khamari¹, Akshya K. Mishra², Samir K. Bhoi³ and Monika Khamari⁴

¹Research Scholar, School of Life Sciences, Sambalpur University, Odisha, INDIA

²Mahamaya Degree College, Odisha, INDIA

³Viswa Seva Govt. High School, Kulundi, Odisha, INDIA

⁴Department of Biotechnology and Bioinformatics, Sambalpur University, Odisha, INDIA

²Corresponding Author: akshyami microbiologist@gmail.com

ABSTRACT

Dopamine is a hormone & neurotransmitter, occurring in wide varieties of animals, including both vertebrates and invertebrates. In chemical structure, it is a phenylethylamine. Dopamine is commonly associated with the pleasure system of the brain, providing the feelings of enjoyment and reinforcement to motivate a process to perform certain activities. It is released (particularly in area such as nucleus accumbens and ventral tegmental area) by naturally rewarding experiences such as food sex etc. Since conjugating is such type of activity i.e. it is also manifested in lower group of filamentous algae, it was thought that how these groups of algae respond to dopamine. The effect of dopamine was studied on the physico-chemical properties of *Spirogyra* and it was observed that the changing the colour to yellow is accomplished by the formation of new compounds (??) needs further investigation.

Keywords- Dopamine, Algae, *Spirogyra*, Physio-chemical properties, Chlorophyll.

I. INTRODUCTION

Dopamine is a hormone & neurotransmitter, occurring in wide varieties of animals, including both vertebrates and invertebrates. Dopamine is a neuro-hormone released by hypothalamus. Dopamine was discovered by Arvid Carlsson & Hillarp at Sweden in 1952. It was first synthesized artificially in 1910 by G. Barger and J. Ewens at Wellcome laboratory London.

Chemically dopamine is dihydroxyphenyl ethylamine with chemical formula $C_8H_{11}NO_2$ with mol. mass 153.178 M.P. is $128^{\circ}C$, solubility is 60g/100ml. It is a member of catecholamine family. The biosynthesis of dopamine occurs at nervous tissue & the medulla of the adrenal gland. Dopamine HCl is used as a medicine in human. It is a life saving drug. It is used in cardiovascular problems. It is used to increase cardiac output & B.P.

Dopamine has a significant role in human life. It inhibits release of prolactin from the anterior pituitary. It helps to regulate blood pressure. Dopamine influences behavior, milk production, sleep, mood, attention and learning. It provides feeling of enjoyment. As per Helen Fisher dopamine is associated with human romantic love

and it plays a key role in regulating mate preference. In animals dopamine stimulates the release of testosterone & estrogen. Likewise, increase in level of testosterone & estrogen promotes dopamine release. Increasing activities of central dopamine can inhibit release of central oxytocin. When dopamine is injected into specific areas of rat it influences copulatory behavior.

Dopamine is mainly associated with animals. In this present study, an attempt was made to study the effect of dopamine on some physico-chemical properties of *Spirogyra* on a pilot scale. This work should be extended to get better results.

II. AIM & OBJECTIVE

1. To estimate chlorophyll content of control algae and algae with dopamine.
2. To estimate the optical properties.
3. To perform colour test for amino acids.
4. To observe structural change of cell.

III. MATERIALS & METHODS

In this present study fresh water algae *Spirogyra* & Dopamine HCl (TTK company 200mg injection 5ml) were taken as materials. Grow algae on distilled water in a conical flask, marked as control, grow algae on dopamine, and marked as algae in dopamine (AWD), light must be supplied. After 4 days of incubation studied carried out in following ways:-

1. Chlorophyll estimation:

Both control and AWD were homogenized with acetone and volume made up with acetone subjected to centrifugation then supernatant was collected and subjected to spectrometric analysis using Arnon method for quantitative estimation of chlorophyll.

Chlorophyll	Control	AWD
A	0.0172Mg/g	0.0323Mg/g
B	0.0089Mg/g	0.0449Mg/g

2. O.D. at filter 4 (New method):

Take dopamine and the filtrate of test solution AWD and subjected to colorimetric analysis at filter 4 tacking distill water as blank. This experiment used for see the effect of algae on optical properties of dopamine.

O. D. OF PURE DOPAMINE	O. D. OF FILTRATE AWD
0.07	0.39

From the result, it is conformed that there is a change occurs in the filtrate dopamine due to the action of green algae (algae consist of various high molecular bio-molecules). Therefore a hypothetical mathematical equation is postulated below which need further investigation and suggestion.

Take distill water as blank. Let conceder, as there is a relation between molecular weight and O.D.

$$\text{Std Dopamine O.D.} = 0.07 = A \quad \text{mol wt} = M_s = 153$$

$$\text{Test Dopamine O.D.} = 0.039 = B \quad \text{mol wt} = M_t = ?$$

$$\text{Difference in O.D.} = B - A = 0.39 - 0.07 = 0.32 = C \dots \dots \dots (1)$$

$$\begin{aligned} M_s \text{ gives O.D. } A \\ \Rightarrow 0.07 = 153 \Rightarrow 1 = 153 / 0.07 = 2185.71 \text{ mol wt} = D \\ \Rightarrow 0.39 = 2185.71 \times 0.039 = 852.42 \text{ mol. wt.} = M_t \dots \dots \dots (2) \end{aligned}$$

$$(C \times D) + A = M_t \dots \dots \dots (3)$$

$$0.32 \times 2185 + 2185.71 = 852.42 \text{ mol wt}$$

So, the new compound formed have mol. wt.
 $M_x = M_t - M_s$ (M_s deducted due to Due to unreacted dopamine).....(4)

$$\Rightarrow M_x = 852.42 - 153 = 699.42 \text{ mol. wt.} \dots \dots \dots (5)$$

From equn5 it found that M_x is a high molecular substance and it may be a protein formed it get conformed by submitting the result in mass spectroscopic databases.

3. Colour test for amino acid:

Filtrate of control (water-algae) = A
 Filtrate of AWD (dopamine-algae) = B

- (I) A reacted with Conc.HNO₃=No colour change (aminoacid absent in A)
- (II) B reacted with Conc.HNO₃=colour change to yellow (aminoacid present in B)
- (III) A reacted with solid ninhydrin (Boil)= No colour change (aminoacid absent in A)
- (IV) B reacted with solid ninhydrin (Boil)= colour change to Violet (aminoacid present in B)

4. Microscopic examination of algae:

After 4days of incubation control algae and algae of dopamine observe under compound microscope it was found that colour of *Spirogyra* change green to dirty yellow, structure of chlorophyll change, cell less pigmented.

IV. RESULTS & DISCUSSION

1. The chlorophyll content in case of AWD is more.
2. The O.D of filtrate dopamine is more than pure dopamine, because the algae contain protein, carbohydrate which react with dopamine and may formed new compounds.
3. The colour of algae change to dirty yellow in presence of dopamine.
4. From the experiment no-3 we get +ve result for amino acid, it may be dopamine detach amino acid from algal protein. The NH₂ group of dopamine may react with C-terminal of algal protein to form a new hypothetical amide compound.
5. The COOH group of algal amino acid react with –OH group of dopamine to give may be a new hypothetical ester compounds.
6. Dopamine may react with algal glucose to form a hypothetical diglucosate compound.

V. FEATURE SUGESTION OF THE WORK

1. The work should monitor at different days and different concentration of dopamine.
2. The pH, electrical properties, phenol, protein content also determine.
3. The suggested compound isolated & identified by mass spectroscopy and atomic absorption spectroscopy and chemical test.
4. The DNA should analyzed using electrophoresis.

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