

## The study of synthetic and natural pigments on the colour of the Albino Oscar

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**ABSTRACT:** In this study, we have investigated the effects of mix of Tomato (*Solanum lycopersicum*) & Carrot (*Daucus carota*) ( and red Bell pepper )*Capsicum annuum*( as a natural pigment source and astaxanthin as synthetic pigment sources on the skin colour of cichlid fish (*Astronotus ocellatus* sp., Agassiz, 1831), which are generally white with red patches in the dorsal skin. The fish were fed diets containing 100 mg kg<sup>-1</sup> astaxanthin and natural pigment. The amount of both natural and synthetic pigment sources given as feed was 100 mg kg<sup>-1</sup>, and the experiment was continued for 60 days. Total carotenoid content of the fish was determined spectrophotometrically at the end of the experiment. As a result, while a visible change of colour in the skin of the fish fed on the feed containing astaxanthin was observed with  $0.43 \pm 0.2$  mg g<sup>-1</sup> of pigment accumulation, a relatively change of colour was observed in the skin of other fish that were fed on the feed containing powder of Tomato & Carrot and red Bell pepper with  $0.35 \pm 0.2$  mg g<sup>-1</sup> of pigment accumulations, respectively. Therefore, it was determined that these pigment sources have an effect on the colour of cichlid fish.

**Keywords:** *Pigments; Astronotus sp; Natural pigment; Astaxanthin*

### INTRODUCTION

One of the most visual attractiveness of marine creatures is the beauty of colors they have. And these colors are caused by The food and the environment surround them. These fishes must be fed by the food which can produce the proper color for them. But some of the ornamental fish producers use false hormones and colors to attract more customers. So they can profit more. But the color that is produced in this way is not permanent and will be pale after some time (Kop, 2007).

Cichlidae fishes that have been studied are one of the favorite aquarium fishes of my friend. Skin of cichlidae fishes consists of various colors.

The color of fishes is mainly because of chromatophore consists of chromatin which is usually found on the skin. Four groups of main chromatin which are (melanin, purin, preidum and carotenoid) produce color in tissues and skins of animals and plants. Carotenoids that are dissolve in fat, produce the colored amplitude of yellow to red in the skin. also

they can produce orange and green colors in semen , skin and viand of fishes (Fuji,1969). cartenoeds that are naturally produced by plants and phytoplankton, are divided into two groups: carotene and xantophil. More than 600 kinds of carotenoid are found in the nature, but few of them are used in animal food, medications , color of food, polish chemicals (Bricaud *et al.* 1998; Ong and Tee 1992).

Using nutritious mixture of planets is noticeable for producing chromatin. And nowadays there are researches being done on the potential of using these chemicals (Gouveia *et al.* 1997; Raymundo *et al.* 2005).

Although in many countries using the source of synthetic chromatins is expensive but It is common to use because it is more available. But some aquariums' prefers not to use such source for its high price (Sales and Janssens 2003).

There is not enough study about the effects of natural and synthetic chromatins on cichlids. So this research was done to compare natural chromatins and false chromatins in red pepper, tomato and carrot.

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## MATERIALS AND METHODS

In this research 45 cases of Albino Oscar (*Astronotus ocellatus sp.*, Agassiz, 1831) fishes were used. These fishes had average weight of 20gr and average length of 7cm. The cases had white body with one or two small red stains near caudal and the sexuality of fishes wasn't considered.

Al together , materials which are used in this research are divided into two groups: consumption and non - consumption material which consists of two pumps that one of them was with the power of 45 w and the other one with 40 w , that they were used to give oxygen to aquariums. Each aquarium had 80cm length, 30cm width and 40cm height and 80lit content. Each experiment was done for three times. And during the experiment, nine aquariums were used.

The wardrobe was netted with two sorts. And in each sort, two aquariums were put. There was a thermometer on the wall to show the temperature of the place. Also there were some other Thermometers on each aquarium to show the temperature. Three aquariums with 50cm length, 30cm width and 40cm height were used for quarantine and clinic.

Also there were some filters in each aquarium to air-conditioning and a Heater for each aquarium to control and fix the temperature. The food consisted of carrot powder, red pepper and tomato.

After placing special filters in the water, we linked the filters to the pumps. We did this up to two days without any fishes in the aquariums. At this project in each aquarium we put 5 fishes with 3 diets with different chromatins. Before putting the fishes we studied the biometry.

Mint heart hen and binder were used as basic food to make pellet and stick condition. To make natural attendance food, dried carrot powder, red pepper and tomato were mixed and frosted with basic food. To make synthetic food, Astaxantin chemical powder was mixed and frosted with basic food. To make control sample frosted basic food was used without chromatin substances.

Biometry was done every 15 days. Fishes were

fed two times a day at 10am and 5pm. We studied the condition of aquariums and the amount of food that was eaten. Because of garbles, extra food and other extra ingredients in the aquariums, they were cleaned every day in order to prevent every disease. Also some antibacterial and anti fungi drug were used every two weeks in order to prevent diseases. In the end of the experiment we used spectrophotometer method to the amount of chromatins in the tissues (Choubert and Storebakken, 1989).

Statistical analysis consisted of one-way ANOVA, using the probability level of 0.05 for rejection of null hypothesis. All analysis was performed using SPSS 16.0 for windows.

## RESULTS AND DISCUSSION

The temperature of the water was measured every day. But PH was measured every 2 days. The average temperature during the experiment was 28.5 C and PH was 7.8. Colored conditions were the same in all of the treatment. At the first, stains were more observed in some parts concluding caudal, pectoral and abdomen. Spectrophotometer Analysis was done to see color changes of fishes' skin that they were fed with different chromatins. The results are shown in Table 1:

Table 1: Spectrophotometer Analysis results

Group	Total carotenoid content (mg/g)
Astaxantin	0.43
Natural chromatin	0.35
Control	0.09

At the first of this experiment the average of chromatins in the skin of fishes was 0.07 mg/g.

In this test changes of colors were exactly seen in similar parts of body, in all of the groups of fishes. Fed fishes with astaxantine were bright red, with aggregation of tissues 0.43 mg/g ( $P < 0.05$ )

As you see in this table, measured chromatins for fed treatment with natural chromatins and with no chromatins are less than first treatment. Also I should mention that fed fishes with natural chromatins had

less growth than the other treatments.

## CONCLUSION

Today carotenoid have a positive rule related to metabolism of fishes (Segner et al.1989). Colors of fishes are controlled by endocrine nerves systems but food sources of chromatins are also important. The effect of carotenoid sources to produce colors is individual. Also all the kinds of fishes don't have similar ways for chromatins metabolism; so we can't consider only one way to transfer the carotenoid in tissues of fishes (Chatzifotis *et al.*2004).

As you see substances with synthetic chromatins have more aggregation in tissues. Also absorption and aggregation of Astaxantin in fishes is more than other carotenoids (Torrissen.1989). And using of B-carotene has less absorption effects compared with Astaxantin in the same duration. Also Astaxantin has better chromatins attributes. And it can cause red color. But B-carotene produces pink color. As the result we should say that fed treatments with Astaxantin are more chromatic in compared with treatment were fed with natural chromatins. It seems that to achieve better results either the amounts of herbaceous substances or the time of feeding must be arisen.

With the results of this experiment it's shown that Oscar fishes are sensitive to the effects of edible of natural and synthetic substances with chromatins. These differences of severity of colors in the groups are because of quality, measure and aggregation duration of these substances. Astaxantin is impressive on the skin of red bream fish and Australian red snapper (Lorenz, 1988; Booth *et al.*, 2004). Also Astaxantin and Contaxantin chromatins or natural chromatins are absorbed in golden bream fish.

Astaxantin doesn't have cancer effects and using of this substance is permissive in most of the countries. But there are lots of researches related to find other chromatins instead of Astaxantin. The reason is because of hygiene effects and expensive costs of this substance compared with herbaceous and natural ones (Between 40% and 60%). The best substitute are herbaceous substances with chromatins because they have nutrition effects (protein: 28% up to 39%,

carbohydrate: 40% up to 57%, fat: 9% up to 14%) also they have chromatins.

Herbaceous substances like red pepper, tomato, carrot that they were used in this experiment have natural carotene and they can produce attractive color in skin of Oscar fishes. However exact ratio of combination of herbaceous substances as source of chromatins and the effect of them on different kinds of fishes, measure, variety of colors and feeding duration are considered as interesting topics for different researches.

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