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Color And Thickness Of The Milk Shark's Skin.

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ABSTRACT

We have studied peculiarities of color and variability of the thickness of the milk shark skin. The average values of RGB coordinates for skin color at various topographic areas were defined: dorsal area — RGB (44, 40, 52); lateral area — RGB (114, 116, 132); ventral area — RGB (183, 182, 187). Differences in skin thickness were found in the dorsal (1.14 ± 0.08 mm), lateral (0.89 ± 0.04 mm) and ventral (0.92 ± 0.05 mm) areas.

Keywords: milk shark *Rhizoprionodon acutus*, colors, thickness, topographic areas.

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INTRODUCTION

The shark skin study is of scientific and practical interest, with due consideration of using shark skins in the leather industry for the production of different types of leather. To scale up the industrial application of shark skins, a preparatory removal of placoid scales from the skin surface shall be done. It should be noted that due to the spike-like structure of the placoid scales, the skin is characterized by a rough grain pattern. In this regard, the shark skin is an excellent abrasive material [1, 2, 3].

The work objective is to study the external features of the milk shark skin associated with the color characteristics at different areas, as well as to consider the variability of thickness in different topographic areas.

MATERIAL AND METHODS

One adult milk shark Rhizoprionodon acutus Rüppell, 1837 (Carcharhiniformes), caught in the Indian Ocean, was studied. The country of shark's origin was Sri Lanka. The whole fish was delivered to the Auchan trading network (Moscow) in a chilled state for sale (Figure 1).

Figure 1: The milk shark Rhizoprionodon acutus in the Auchan. The shopping and entertainment center "Filion", Moscow. Photo by A.B. Kiladze

Typical images of the dorsal, lateral, and ventral areas of the skin were processed using a program, freeware version of which is available at: https://www.imgonline.com.ua/get-dominant-colors.php [4].

To determine the differences between the skin color in different topographic areas, a palette of three colors was taken with the indication of the alphanumeric color code and its RGB coordinates. Coordinates in the RGB format can vary from black (0, 0, 0) to white (255, 255, 255) in color.

The thickness of the skin was studied by samples taken from the area of the tail stem. Samples of the skin were cut from the dorsal (five samples), lateral (three samples) and ventral (three samples) areas. The thickness was measured at three points on each sample using a digital caliper "Carbon Fiber Composites Digital Caliper" (Made in China) with an accuracy of 0.1 mm. The results were processed using the methods of variation statistics [5] by means of STATISTICA 10 software (StatSoft, USA).

RESULTS AND DISCUSSION

For the primary technological, materials engineering and merchandising analysis, such important properties as color and thickness of the skin cover should be considered.

The assessment of color features is necessary for the visual quality control of raw materials, within which attention should be paid to the absence of blood stains on the skin surface; surface yellowing which may indicate oxidation of fat; foreign spots indicating various biodegradation [6]; and a lack of visible linear and areal defects [1]. The color of the skin should have a natural shade which is particular to this type of rawhide. For gray sharks Carcharhinidae in general and the milk shark in particular the color of the skin is characterized by consistency, which is manifested in the dark gray, turning into black at the dorsal area, gray or light gray at lateral area, and silver or off-white at the ventral area (Figure 2).

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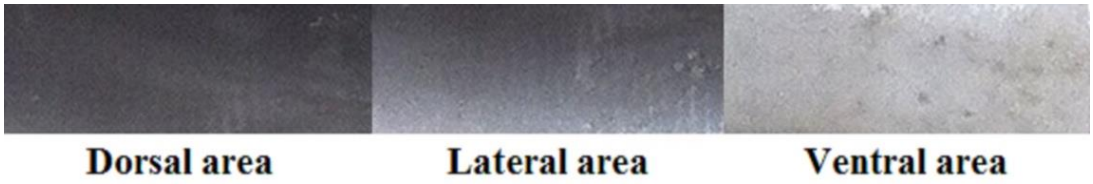

Figure 2: The color of the milk shark's Rhizoprionodon acutus skin at different topographic areas

Colorimetric analysis is an objective method of studying color shades [7] while the resulting color palette presented in RGB coordinates makes it possible to confirm the color trends identified with the use of organoleptic control methods. The attained results indicate an increase in the values of RGB coordinates which demonstrates the gradual lightening of the skin observed in the direction from the dorsal area to the ventral area of the milk shark (Figure 3).

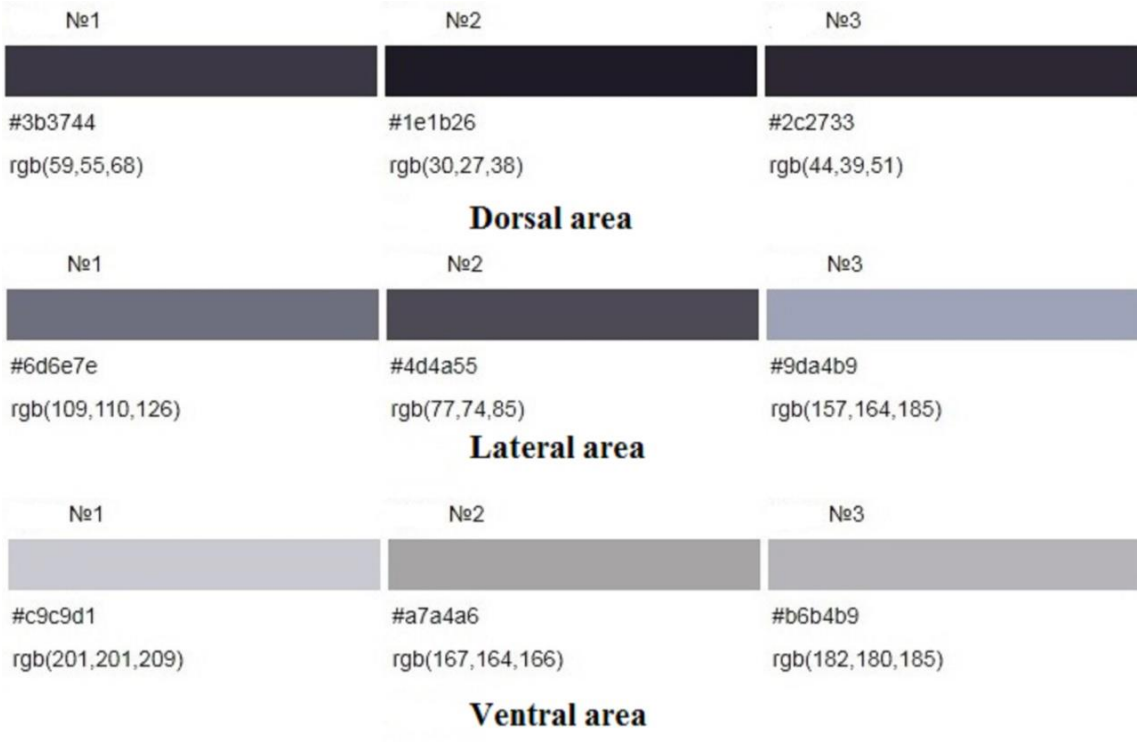

Figure 3: The color palette presented in RGB coordinates peculiar to the milk shark's Rhizoprionodon acutus skin at different topographic areas

The darkest color is color No. 2 at the dorsal area with RGB coordinates (30, 27, 38), and the brightest is color No. 1 in the ventral area having RGB coordinates (201, 201, 209). The averaged values of RGB coordinates have the following parameters for each topographic area: dorsal area — RGB (44, 40, 52); lateral area — RGB (114, 116, 132); ventral area — RGB (183, 182, 187).

The use of bioinformatics methods of analysis for color parameters of rawhide, which were previously determined visually and attributed to aesthetic properties in most cases, will extend the instrumental boundaries of expert activities based on objective approaches.

As for the thickness of the skin, which predetermines both the strength and gravimetric properties and the production purpose of rawhide, we should mention some thickening of the dorsal area in comparison with the lateral and ventral areas showing approximate equality in average values (Table 1).

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Table 1: Thickness of the milk shark's Rhizoprionodon acutus skin at different topographic areas

Topographic areas and sample size	Statistical parameters			
	M ± m*	Lim	± σ	Cv, %
Dorsal area, mm (n = 15)	1.14 ± 0.08	0.7 — 1.9	0.33	28.95
Lateral area, mm (n = 9)	0.89 ± 0.04	0.7 — 1.0	0.11	12.36
Ventral area, mm (n = 9)	0.92 ± 0.05	0.7 — 1.1	0.16	17.39

*Note: n is the number of measurements; M ± m is the arithmetic mean with the error of the arithmetic mean; Lim — parameter limits; ± σ is the standard deviation; C_V is the coefficient of variation.

Attention is drawn to the significant variability of the thickness of the skin at the dorsal area, as evidenced by the considerable extent of the trait, which led to a high value of the variation factor. The remaining topographic areas have an average thickness variation pattern which indicates greater stability of this parameter.

CONCLUSION

In conclusion, it can be noted that the data on color variations and differences in the thickness of milk shark skin reflect the objective nature of topographic variability which should be taken into account in production and procurement activities, and should be considered as a diagnostic feature in biological research.

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