THE FORMATION OF COLORS IN NATURE AND THEIR CHARACTERISTICS OF CHANGE

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Abstract: This article scientifically covers the process of color formation in nature, their spectral structure, and human perception. The contribution of such scientists as Newton, Lomonosov, Helmholtz, and Goethe to color theory is analyzed in a simple, consistent, and scientific tone. The basic laws of achromatic and chromatic types of colors, their warm-cold classification, changes depending on the environment, and complementary color systems are described.

Keywords: coloristics, spectrum, achromatic colors, chromatic colors, complementary colors, light, hue, saturation, Goethe, Newton, Helmholtz

The emergence of colors, their influence on human consciousness, and their significance in painting have long been one of the important directions of scientific research. Color is studied not only as a physical phenomenon, but also as a concept inextricably linked with human perception, imagination, and mental state. For this reason, the scientific foundations of color theory were formed by many scientists in different historical periods.

One of the first major scientific studies on colors was conducted by the English scientist Isaac Newton. He proved that as a result of the refraction of white light by a prism, the spectrum splits into seven different colors. This experiment showed that the true nature of colors is connected with the refraction and reflection of light.

The Russian scientist M.V.Lomonosov expanded the concept of color and attempted to scientifically classify the main colors. In the 19th century, the German scientist G.L.Helmholtz emphasized the need to study color based on three main indicators - hue, brightness, and saturation. This approach forms the basis of modern color theory.

The German poet and art critic I.V. Goethe interpreted color not only as a physical phenomenon, but also as an aesthetic element with the power of spiritual influence. He divided colors into warm and cool tones and studied how they affect a person's mood.

Colors in nature are divided into two main types:

Achromatic colors - white, gray, black. These colors have no hue, they differ only in the degree of illumination.

Chromatic colors - spectral colors and their mixtures. They have their own specific tones, saturation, and light levels.

When gray is added to chromatic color, it becomes dull, its saturation decreases. This process leads to an even “darker” appearance of the color.

- Warm and cold color system
- The color wheel is conventionally divided into two parts:
- Warm colors: red, orange, yellow and related tones.
- Cool colors: light blue, blue, azure, violet, and similar shades.

Such a classification is associated with the associative nature of color in nature: red resembles fire, blue - water and sky.

Color addition and complementary colors

Colors give different results depending on their combination as optical and paint. When red, green, and light blue combine in optical fusion, white light is formed. When dyes are added, impurities close to dark shades are formed.

If two colors combine to produce white, they are called complementary colors:

red - green,

yellow - blue,

orange - blue,

yellowish-green - purple.

When such colors are applied side by side, they enhance each other's brightness, which is an important compositional tool in fine arts.

Color change depending on the environment

The natural “personal” color of objects changes under the influence of the light and surrounding colors present in the environment. For example:

the gray object acquires a bluish-green hue in red zonal light,

In a green environment, it can appear pink.

Also, the color of the object changes with distance - this is called aerial perspective. Distant objects usually appear in cooler and weaker tones.

All these cases together give rise to the concept of conditional color. When depicting nature, the artist must observe and correctly reflect these conditional tones.

In conclusion, it can be said that the formation of colors in nature, their spectral properties, their influence on human mood, and their change depending on the environment are based on complex scientific processes. Newton’s optical research, Lomonosov's scientific explanations of color, Helmholtz’s system of three signs, and Goethe's aesthetic approach played a significant role in the formation of the science of color theory. Achromatic and chromatic types of colors, their warm-cold classification, complementary colors, and the concept of conditional color serve as a necessary theoretical basis for creating a correct image in fine art.

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