Optical Vision of microscopic living tissue as a Source for innovative Design in Printed Textile Hangings

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Abstract:

The environment has been a source of inspiration and discovery of shapes which man has been actively pursuing .Since his beginnings, man's dreams of controlling the environment and of ability to change things and know more of its mysteries by inventing means that enable see details and increase knowledge.With the invention microscopes, man investigated nature and identified the objects not be seen by the naked eye and observed structural details of natural elements. These microscopic observations of shapes and structural details has been a major source of inspiration the artists and designers for their artistic works.

In the early 20th century and with the invention of complex optical microscope with a relatively high ability to amplify up to 1,500 times the specimen.Biologists have been able to identify many of the properties of the animal cell, as well as the shape and types of bacteria. However, they were unable to identify accurately the molecular structure of some cell components and identify objects too small to be detected by optical microscope. When electronic microscope was invented and developed at the beginning of the second half of the last century, it was possible to detect many components of the cells (Ultra structure) and its mechanisms. They have also been able to identify viruses and their different types and have led to great progress in biological sciences; and at that momentit was surprising that these electronic microscopic images bear an unimaginable diversity of shapes, colors and other aesthetic values.

The optical vision of aesthetic values of designers and artists was able to discover the beauty of these electronic microscopic images. This studyis interested in the use of some images of electronic microscopic living cells and tissues in design printed textile hangings.

Research problem: Continuous development in the printing of hanging textiles always requires the search for different sources that inspire the textile designer to modernize and keep up with functional purpose. Recently hundreds of electronic microscopic image of organisms have come out bearing many distinguished aesthetic values. To what extent can we utilize these imagess in the design of printed textile hangings?

Search Objectives: 1 - Studying of outcome of some modern technology such as electronic microscopic image from artistic perspective.

2. Searching for the extent to which the optical vision can affect the beauty of electronic microscope images.

Research hypotheses: The research assumes that:

1. Electronic microscopic images of living organisms bear high aesthetic values that can inspire modern designs of high aesthetic values, suitable for printing textile hangings.

Research approaches: 1. This research follows the descriptive approach: which collects information and detailed data of electronic microscope images.

2. The analytical approach: includes the interpretation and analysis of facts, information and data of electronic microscope images in order to achieve the required design.

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Research terminology:

Microscope: A device used to magnify small objects, making it easier to study these objects. The function of the microscope is not limited to the magnification, or displaying the appearance of the material being studied in a larger viewable form, but rather to display the fine details (Resolution) of the inspected specimen.

1. **The electron microscope:** uses a beam of electrons that magnify objects instead of using visible light and uses electromagnetic lenses instead of glass lenses. There are two types of electronic microscopes:

a. **Transmission electron microscope (TEM):**

Transmission electron microscope, is type of electron microscope that has three essential systems: (1) an electron gun, which produces the electron beam, and the condenser system, which focuses the beam onto the object, (2) the image-producing system, consisting of the objective lens, movable specimen stage, and intermediate and projector lenses, which focus the electrons passing through the specimen to form a real, highly magnified image, and (3) the image-recording system, which converts the electron image into some form perceptible to the human eye. The image-recording system usually consists of a fluorescent screen for viewing and focusing the image and a digital camera for permanent records. In addition, a vacuum system, consisting of pumps and their associated gauges and valves, and power supplies are required.

b. **Scanning electron microscope (SEM):**scanning electron microscope is a type of electron microscope that produces images of a sample by scanning the surface with a focused beam of electrons. The electrons interact with atoms in the sample, producing various signals that contain information about the surface topography and composition of the sample. The electron beam is scanned in a raster scan pattern, and the position of the beam is combined with the detected signal to produce an image. SEM can achieve resolution better than 1 nanometer. Specimens are observed in high vacuum in conventional SEM, or in low vacuum or wet conditions in variable pressure or environmental SEM, and at a wide range of cryogenic or elevated temperatures with specialized instruments.

Photomicrography-Photography:

Cytology is a relatively recent science that has experienced great progress in the twentieth century due to great discoveries in the field of molecular biology. Which was achieved by seeing the cells with optical microscope. Scientists were able to learn more about cells and variations in their forms and functions, but without full knowledge of the interior parts of cells and some microorganisms that cannot be seen by the optical microscope. In the early 1950s, with the use of the electronic microscope, different unseen microorganisms were identified and called viruses, many of these viruses cause serious diseases such as AIDS, Ebola, influenza and hepatitis.

If we compare the shape of the cell under the optical microscope and its shape under the electron microscope, what appears to be a simple structure under the optical microscope, looks complex compound under the electronic microscope. For example, the outer plasma membrane of the cellwhich appear to be a protective membrane that protects the cell components and surround them under the optical microscope is in fact a lipidliquid barrier under the electronic microscope.It is made up of two layers of phospholipids.There is also the nucleus of the cell that appears as a small globular body inside the cell under the optical microscope but under the electronic microscope the nucleus appears as a complex globular body surrounded by a complex membrane that contains chromosomes composed of DNA.

Images of electron microscope from artistic point of view:

Electron microscopic images have helped to develop biological and physical sciences, these images are in its majority contain different structure with a high aesthetic value in shape, composition, color and consistency and other values which can be a new natural source that can inspire the artist in all artistic fields with unprecedented forms and shape that keep up with the time.

If the relationship between art and sciences is old, then, applied arts that links between function and form are an example of this relationship. Science has always been used the art in drawing illustrative figures that help to understand and simplify science.But, the artistic utilization of science through microscopic images started by student of postgraduate studies in physics at the University of Florida, as he photographed a number of compounds such as vitamins, drugs and metals by optical microscope and was able to obtain a number of images that were noted for their aesthetic and artistic distinctive values. He sold these images to different marketing and textile manufacturing companies to using them in different modern designs.

The microscopic images, which were photographed electronically, were published by biological research centers concerned of biological studies and the internal components of cells and their functions, as well as the appearance of different types of cells. For instance, how the fertilization process is completed, the formation of the zygote, its division and its adhesion to the wall of the uterus during the first days of pregnancy was monitored and recorded. And how the cells of the sensory organs (hearing, sight, smell and touch) in human to construct to fit with its function even though its origin is one cell.

Application side:

The practical idea of the current research is to draw a number of designs for printed textile items inspired by its elements by combining forms of random lines produced with stencils and three-dimensional parts inspired by images of electron microscope of cells and living tissues through four steps as follows:

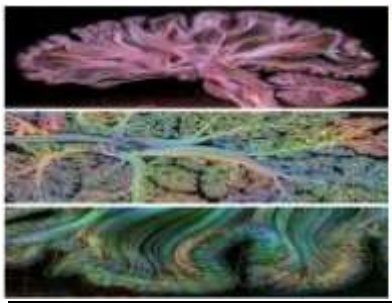
Step 1: Depend on stencil set of linear shapes with different thickness and densities on stencil paperand then printed on a set of cotton fabrics fabricated using the paste of the pigment to carry out color grading and then fixing of the prints using steam ironing.

Step 2: The printed fabrics were printed with scanners and transferred to Photoshop where the researcher prepares linear shapes in a set of elements

Step 3: Select a set of elements inspired by electron microscopic images of some cells and tissue and some viruses

Step 4: Create 8 designs using the Photoshop program by combining linear elements and the elements taken from the electron images of cells and living tissues, where the researcher highlighted her skill in creating a set of design ideas using different design principles and different color relationships in distribution and integration of these elements to achieve the objective of the research to confirm the optical vision of the designer in showing the aesthetic values of this microscopic images and utilizing them scientific and technically by printing them using the digital printing method and analyzing them artistically.

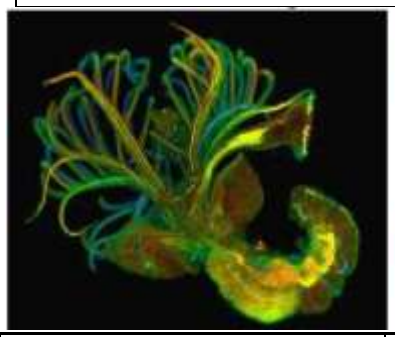
Some printing experiments using stencil technique



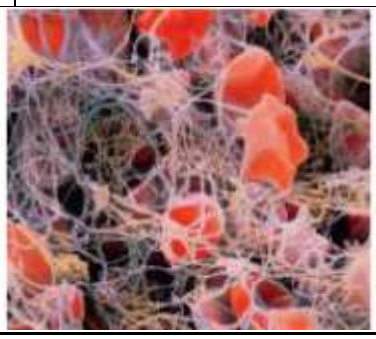
brain cells under microscope

Eye under microscope

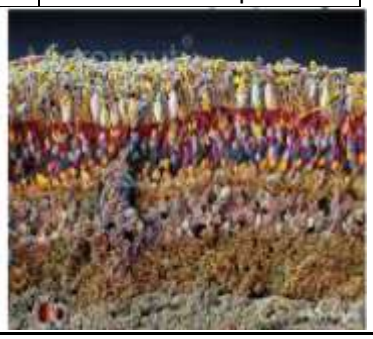
Respiratory tissue under microscope



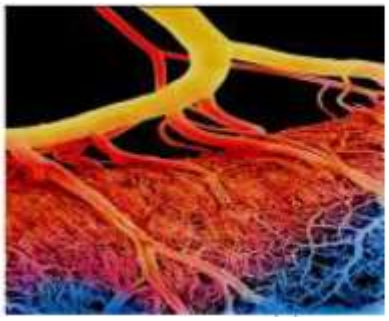
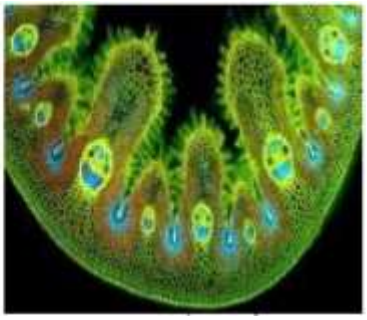
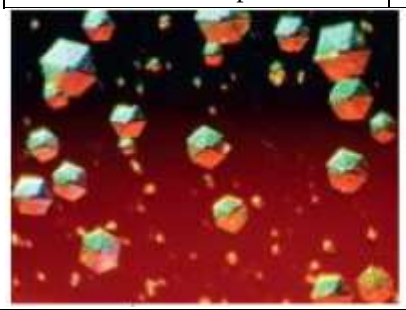
Optical cell under the microscope



Blood clot under the microscope



Retina under the microscope

		
Kidney nephron under the microscope	beetle leg under microscope	small intestine villi under the microscope
		
insulin hormone	appendices in trachea	fallopian tube

Some images for tissue and live cells what were analyzed artistically and used for designing printed textile hangings.