

Exhibit Collection

The Exploratorium's core exhibit collection consists of five broad content areas and a temporary exhibition program, for which the museum develops its own exhibitions, as well as hosts those from other organizations. Exhibit content areas include:

SEEING

The illuminating insights into the complex process of interpreting our world through our eyes, our brains and our own subjectivity. **Seeing** is organized by subject areas as follows:

Light and the Eye

Consider that the images formed by light on the backs of our eyes are flat, upside-down, distorted, full of holes, out of focus and obscured by dark networks of blood vessels. It's amazing that we see at all! *Light and the Eye* deals with the anatomical and physiological features of the light-sensing eye. Exhibits in this area suggest, our eyes, even in the initial stages of vision, are not just passive cameras. The *Eyetracker* follows the motion of your eyes as



Colored Rooms

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Photo credit: Lily Rodriguez

you study images, showing our continual scanning of our world—and how we each focus on different aspects of the same scene. At *Red/Green Goggles*, saturate your right eye with green light and your left eye with red light. Then look at the world by blinking one eye and then the other—friends go from rosy good health to sickly, to the say the least, as you learn about how your eyes respond to colored light. And the *Fovea Remover* shows how a brief flash of light can eliminate your ability to see details—temporarily, of course!

Seeing Color/Seeing Motion/Seeing Depth

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The eye and brain together perform amazing feats. Sometimes you see color where there is only black and white, or black and white where there is color. Sometimes you see three dimensions where there are only two. Using one eye, you may even see two dimensions where there are three. **Seeing Color, Seeing Motion, and Seeing Depth** exhibits demonstrate how our visual system does not simply record the light that enters our eyes—it interprets the light, in often surprising ways. At *Colored Rooms*, illuminated rooms appear to be the same, but when identical objects are placed inside, they seem to have strikingly different colors. *Silage Beach* shows how an environment in motion can cause us to perceive that we are moving—even if we're standing still. At *Dancing Dots*, you encounter colored circles on a piece of paper. When the paper is moved, one of the dots appears to slide on the page while the others move along with the paper as expected. *Seeing Yellow* presents two different mixtures of yellow light, which appear to be identical. Your visual system cannot tell them apart, but a two-color filter reveals a striking difference. *Disappearing Act* illustrates how easily objects can blend into their backgrounds—until they move.

Seeing In Context, Paying Attention

We don't see in piecemeal; we always see individual things within a larger environment—like a bright white moon against the black night sky. In fact, the moon is dark gray and only appears bright white because of its context against the black sky. The exhibits in **Seeing In Context, Paying Attention** bring home the way that everything in a scene— noticed or not—affects our perception, and illustrate the powerful role of attention in what we see. For instance, would you believe that you might perceive a round object on the wall as a clock, and the same object, when on a table, as a plate? Or that there could be more light coming from a chunk of coal in sunlight than from a normal sheet of paper? *Bright Black* explores the powerful roles of context and illumination in how we judge brightness. At *Shadow Colors*, find out that shadows may seem to be colors they're not—even though shadows have no colors at all. These exhibits also illustrate how our brains make choices about *what to see*. At *The Disappearer*, clearly visible objects on a round platform disappear before your eyes when the

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background begins to rotate. Similarly, find out the shocking truth about all that you can NOT see at *Basketball*. Without giving away what researchers have learned about how easily we can miss even obvious things, suffice it to say that at this exhibit, following the ball is not always the best advice—even if most basketball players are noted for their visual acuity.

Interpreting Images

Interpreting Images reverses the old phrase *Seeing is Believing* to create the equally accurate *Believing Is Seeing*. This section explores the roles of ambiguity, culture, and belief in the process of vision, highlighting the profound subjectivity of seeing. For example, *Blank Comics* are comic strip frames with no dialogue. Insert your own dialogue, and learn the way visual cues cause us to interpret images—and how different people see very different events in the same scenes. *Perspectives* takes this idea one step further, as it lets you be a “director,” putting scenes together in different ways to change the meaning of a complex social event. As you choose different sequences of camera shots of the same scene, discover how such choices impact what viewers see, and therefore understand. This section will also include the **Seeing Gallery**, a space devoted to artworks illustrating the infinite ways we can interpret images. The **Gallery's** rotating exhibitions will feature everything from artworks by visually impaired artists to experiments in multimedia.

Other Features of the Collection

Seeing Station

Supervised and small group activities include the use of lasers to study optics, state-of-the-art medical technology providing views inside the living eye, and demonstrations of how card tricks are based on expectations and attention. Visitors can also experiment with how the eye and brain work together to create illusions.

The Eye Curiosity Shop

Explore the kitsch and culture of the eye. Many cultures have viewed the eye as the window to

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the soul. The concept of the *Evil Eye* has appeared in many cultures over the centuries, and representations of eyes signifying wisdom or protection from evil abound. In this country, the eye appears on everything from the dollar bill to advertising campaigns for mascara and monster movies. Here, visitors can explore the vast range of depictions of eyes, a range which illustrates the enduring importance humans have always placed on seeing.

Works by Artists

Bill Bell's *Between the Lines*, Gerald Marks's *Professor Pulrich's Universe*, Bob Miller's *Sun Painting* and Paul Kaiser's *Inkblot Perceptions*.

TRAITS OF LIFE — A NEW LIVING LABORATORY

The riotous diversity of life masks an underlying unity. Deep down, we're all alike. We all reproduce, use energy, and change over time. And we're all made of cells, genes and DNA. The over 30 exhibits and demonstrations in **Traits of Life** bring these themes to life. Highlights follow:

LIFE SHARES COMMON MATERIALS.

The directions to create life's diverse forms are stored in an organism's genes, deep inside its cells, written in the language of DNA.

Cell Demo: Some living things are composed of only one cell. A demonstration using a high-quality microscope and single-celled organisms show the components of single cells.

Glowing Worms: A jellyfish gene makes these worms light up. The worms produce the glow protein — green fluorescent protein, or GFP — taken from jellyfish genes, and made visible here under an ultraviolet light that illuminates their nerve cells.

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DNA Extraction Demo: All living things contain DNA in their cells. The extraction of DNA from visitors' cheek cells can be examined.

Embryo Station: All multicellular organisms develop from a single cell in similar ways. A presentation of various living embryos in the early stages of differentiation and development.

Research Zoo: Living things share many fundamental parts — including genes, proteins, and cells — that work in similar ways. Scientists study a particular “model organism” to understand how other organisms, including humans work. Those on display include brewer's yeast, roundworm, fruit fly, zebrafish, common wall cress, and mouse.

LIFE CREATES MORE LIFE.

From the division of a single cell to the union of two organisms, life creates more life with—and without— sex.

Sea Urchin Fertilization Demo: Most living things reproduce sexually to create genetically different offspring. In this demo, a visitor witnesses the breathtaking moment of fertilization, when sperm meets egg.

C-Fern Demo: Plants have developed many different strategies to reproduce. These ferns can reproduce sexually. Visitors will witness swimming C-fern sperm — as they move towards eggs before one's eyes — a plant's strategy for reproduction that some associate more with animals. A demonstration using *Ceratopteris fern* and the release of motile sperm illustrates one strategy for plant reproduction.

Self-Propelled DNA/Live Sperm and Eggs: A live microscopic presentation of sea urchin sperm via an interactive microscope illustrates how different species use sperm to fertilize an egg. Note how sperm and eggs from a sea urchin bear a striking resemblance to sperm and

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eggs from a human being.

Pollination: We can't see the ultraviolet patterns on these flowers, but bees can. This exhibit uses UV filters to reveal the flower patterns that attract insects so that the flower gets its pollen — male sex cells — to reproduce.

Flower Dissection Demo: Flowers are the reproductive structures of plants. A simple flower dissection.

LIFE CHANGES OVER TIME.

The great variety of forms life has taken as it has evolved is largely the result of changes in DNA.

Mutant Flies

A single change in a gene can create drastic changes in an organism. Whether a fly turns out “normal,” or has white eyes, no wings, or a black body, depends on the information carried on its genes.

Goldfish

Selective breeding by humans has generated variety among a species. A large tank of goldfish displaying variants created by humans. The first “mutant” goldfish was noticed some 2,000 years ago and started in Japan and China. The Chinese created many fancy varieties.

Genes Connect Us All.

Organisms from different species share a surprising number of genes with similar functions. This exhibit helps you think of your genes as fossils, holding clues to our ancient origins.

LIFE USES ENERGY.

All living things need energy to survive.

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Respirational Interdependence: One organism's waste is another's sustenance. A small scale, interactive community of living organisms (grass and termites) allows visitors to explore the relationship between photosynthesis, aerobic respiration, carbon dioxide and oxygen.

Bacteriapolis: These photosynthetic bacterial communities are striking for their colorful bacteria that use pigments to capture energy from sunlight.

Termitarium: A fascinating colony of termites, which includes three "castes," or roles: workers,

soldiers, and reproductives. Wood has energy; the termites use the sun's energy trapped in wood.

Energy from Death/Rotting Carcass: The insects, bacteria, and other organisms in this tank are playing a critical role in the energy cycle.

Microscope Imaging Station (a work in progress)

Even more spectacular is the Imaging Station, the place to witness the amazing development of live embryos — including fish, worms, and fruit flies—in real time, and watch time-lapse movies. The station will be fully operational in the fall of 2003. At that time, visitors can also control the microscope via interactive controls. The completed **Microscope Imaging Station** will have four visitor-accessible microscopes, and be used for scientific research. Major support for this project comes from the National Institutes of Health and The David and Lucile Packard Foundation, with additional support from Carl Zeiss Microscopes, Technical Manufacturing Corporation, Technical Instruments, and Universal Imaging.

MATTER/WORLD

The "stuff" that comprises our world and the expression of this physical phenomena, this

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section of the Exploratorium includes exhibits on electricity, heat and temperature, motion, weather, and complexity.

MIND & LEARNING

This section includes exhibits on language, memory, psychology, cognition, and learning. Exhibit development efforts continue including the current Exploratorium-produced travelling exhibition called Memory, and plans for expansion into different areas of cognition, including attention, problem-solving, creativity, decision-making, dreams, humor, emotions, and consciousness; and advances in brain-imaging research.

SOUND AND HEARING

This section includes exhibits on auditory perception, music, sound, resonance, and vibration. Exhibits will be expanded to incorporate more cultural and artistic examples, and closer connections to the Life Sciences.