Abstract
This paper addresses visual art’s relationship to genetics and its attendant metaphorical representation. By diagramming models of the ways in which DNA is visualized and comprehended as a system of signs, parallel conceptions between art history’s engagement with abstraction, recontextualization, and duplication is compared to genetic process and laboratory experimentation.

The Chimera

1. (a) A fire-breathing she-monster in Greek mythology having a lion’s head, a goat’s body, and a serpent’s tail. (b) An imaginary monster compounded of incongruous parts. 2. An illusion or fabrication of the mind, esp. an unrealizable dream. 3. An individual organ or part consisting of tissues of diverse genetic constitution [1].

The practice of art over the last several decades has relied heavily on techniques of recontextualization. Whether in the form of installation, appropriation, or digitalization, relationships between parts and wholes, handmades and readymades, originals and surrogates saturate the discipline of art and its discourse. The transformation of material into metaphor by cutting and pasting is a procedure familiarly known as collage. Here aspects of one image are substituted and reconfigured as part of another. Originating with the Cubists, Dadaists, and Surrealists, this technique creates images that are psychologically, philosophically, and aesthetically complex.

The collage device, like film editing, joins disparate elements in space and time, and in doing so seemingly fuses fact with fiction. By raising questions concerning authenticity, reality, and the nature of visually coded representational systems, collage has had profound perceptual effects. In his photomontage German Natural History 1934 (Fig. 1), John Heartfield situates members of the German government in three biological stages of development. Following the evolution diagrammed in the photograph, Heartfield comments on the inevitability of Hitler’s rise to power by linking the Weimar Republic with fascism [2]. Here metamorphosis links natural history and political power. The politician is joined to the insect, and a visual muta-
tion, a chimera, is created. The chimera has appeared once again, not just in art but in biology itself. A recent example has been created by David Ow, a biologist at the University of California, Berkeley. He has fused the genetic material of a firefly and a tobacco plant, forming phosophorescent plants, that is, tobacco that glows in the dark [3]. By understanding the ways in which aspects of one biological kingdom can be useful to another, the goal of this type of research is to combat disease. Nevertheless these experiments, by breaking species boundaries, change our relationship to living matter. For example, if one is a strict vegetarian, would one be violating one’s principles by eating a tomato whose genetic material has been altered with flounder genes for purposes of frostproofing? Are the boundaries between art and science becoming blurred as the collage technique manipulates life? Are manipulated life forms art?

This text explores the ways in which genetic imaging operates as aesthetic signs. Addressing this subject from diverse directions, the examples set forth range from to in this text, while sometimes beautiful, more importantly employs the visual language or iconography of science as an index of social and cultural codes.

**The Copy and the Copyright**

*Copy.* 1. An imitation, transcript, or reproduction of an original work (as a letter, a painting, a piece of furniture, or a dress). 2. One of a series of mechanical reproductions of an original impression.

*Copyright.* 1. The exclusive legal right to reproduce, publish, and sell the matter and form of a literary, musical, or artistic work.

*Clone.* 1. A group of genetically identical cells or organisms all descended from a single common ancestral cell or organism. 2. Genetically engineered replicas of DNA sequences [4].

A 1993 article in *The New York Times* described the cloning of the first human embryo [5]. This method, although common in animal breeding or occurring naturally in identical twins, raises serious ethical questions concerning the integrity and uses of life. Since embryos can be frozen and used at a later time, identical twins could be born years apart [6]. Cloning, however, is not the only way to copy genetic information. PCR (polymerase chain reaction) does in the laboratory flask what the Xerox machine does in the office [7]. This method replicates DNA through instruction, and can make as many as a trillion copies. Andy Warhol’s replication of images (Fig. 2) by photosilkscreening to all intents and purposes clones the *Mona Lisa* and a host of other cultural icons. As Warhol said in the title of one of his works, *Thirty Are Better Than One* (1963) [8]. Copyright, normally associated with the protection of artistic intellectual property, is now equally offered up to the biological domain. Gene sequences, once they are translated into a letter script, can be and are patented.

The current artistic practice of appropriation, or the copying of one artist’s style by another, is a form of cloning, a benign plagiarism. It tests the notion of the copyright while at the same time challenging the accepted value of originality. Appropriation may copy form, but it does not copy intent or historical context. Ronald Jones’ 1989 work *Untitled (Core of the Human Retrovirus)* may look like a Brancusi, but it operates on totally different principles. While the Brancusi was created as a transcendent, spiritual form, the Jones is secular in the extreme. It is a casting in bronze of the deadly HIV virus. The viewer is confronted with the fact that such a “significant” form can have unequivocally malignant power.

**The Genetic/Aesthetic Matrix**

*Matrix.* Cyberspace, where “bright lattices of logic unfold across the colorless void” [9].

*Genetics.* 1. The scientific study of heredity. 2. Related to or determined by the origin, development, or causal antecedent of something; coined by William Bateson in 1902 [10].

*Aesthetics.* 1. A branch of philosophy dealing with the nature of beauty, art, and taste; coined in 1825 by Baumgarten.

Genetic material, microscopic in scale, can be made visible by a number of laboratory methods, mapping devices, and diagrammatic models. Each representation focuses on different levels of cellular and molecular organization, the double helix...
being the most popular representation of DNA. Although it only became sharply visible through a microscope in 1990, as a model it is the twentieth century’s iconic molecule. In Tony Cragg’s 1988 work *Code Noah* (Fig. 3), stuffed animals cast in bronze are welded together in a spiral chain. Consisting of two intersecting bands, this sculpture refers to the physical structure of the molecule DNA. Has life itself taken the form of commodity culture?

As physical structures located in the nucleus of the cell, chromosomes carry the molecular sequences of genes. Chromosomes—the term is taken from Greek roots meaning “colored bodies”—appear in several styles and sizes. They catalogue species and gender information by functioning as hereditary templates to all life forms. Steve Miller’s *Portrait of Isabel Goldsmith* (1994) represents a direct dispersion of human chromosomes under the electron microscope. During their moment of replication—a process that has the dynamism of dance—the chromosomes elongate, form chains, and then replicate into identical pairs. Relying on the supravisional, Miller has been working with a variety of technological imaging devices, from sonogram to CAT scan. In a manner reminiscent of a visual autopsy, he reduces life to a series of clues.

Whereas mapping in cytogenetics is based on physical structure of chromosomes, that of molecular genetics is based on smaller units known as genes. Molecular genetics codes the sequences of genes by using four letters representing the nucleotide bases A, T, G, or C [11]. Each person embodies his or her own particular variation of the sequence, making every individual unique (at least biologically). Kevin Clarke’s photographs combine a laboratory-derived alphabetical sequence with a symbolic icon. In *Portrait of Jeff Koons* (1994), a cash register is superimposed on a molecular printout derived from a sample of the subject’s blood. In Clarke’s portraits, the self is portrayed as the combination of internal biological language and a logo associated with the person’s identity in the world.

DNA sequencing can also appear as a series of band patterns arranged in discrete lanes. As a genetic fingerprint technique, this method of visualization is used in forensic science to establish identity and to animals, this concept is called “breeding”; when applied to humans it is called “eugenics.” Eugenics, needless to say, has a questionable social and moral history. In *Thunder Rumble* (1994), Nicolas Rule relies on family history to draw the bloodlines of racehorses. The lines connecting different generations are drawn in red. They seem to follow the gesture of gravity, indexing its capacity to form notations by drips. Conceptual and diagrammatic, Rule’s work creates the visual lineage of a specialized and rarefied commodity, the racehorse. For the artist, painting is another rare and specialized commodity operating in a system of scarcity and manipulation.

Using glass, steel, and print, Eve Andre Laramee questions the power of scientific authority in her laboratory tableaux. With alchemical apparatus, in *Science of Approximation* (1993) Laramee points up the ambiguity in measurement. Is the laboratory the place where scientific truths are found? Like Marcel Duchamp, whose works used language and complex visual puns to expose language’s indeterminacy, Laramee sets up a laboratory intent on questioning the paradigms of experimental science. By intermixing quantifiable truth with intuition and belief, Laramee opens up possibilities beyond formal scientific discourse.

Geraldine Erman’s sculptural pieces can be discussed in terms of eighteenth-century science, in which the homunculus and the preformation theory of conception figured prominently:

[It was believed that human beings were created by God at once, at the beginning of time. Preexisting tiny germs (the fabled homunculi) were immaterially encased in molds, or boxed—as an emboiment—within the egg waiting to be actualized by the male sperm. Coming forth simply meant that beings were unveiled, revealed, or unfolded in successive temporal generations [13]. This conception of morphology is evi-
dent in Erman’s work through her portrayal of the cell as an architectural bubble. Encased within, body parts are suspended as uncanny nightmares.

George Gessert is an artist who works with live DNA. Cultivating irises, as Edward Steichen did with delphiniums, Gessert’s experiment-like activities extend the definition of live art. Performance art converts gesture and body into real time; thus, like breeding, it has qualities of the ephemeral. Some of Gessert’s experiments have been called “genetic graffiti” [14]. He has taken irises that he has cross-pollinated and has distributed them into wilderness areas. His dispersals of “fictional” genomes intervene in an ecosystem dominated by natural selection.

Chris Doyle’s 1994 video installation Greenbathing (the Kingdom-Switch Cycle) is a metaphorical attempt to replicate the photosynthetic cycle in human beings. The installation consists of two wall-mounted monitors, both of which face upwards. The first has a tray of water containing green algae placed on the top of the lighted screen. The second plays a tape showing a person crouching in a small basin which contains chlorophyll, algae, and water. As the person scrubs his skin, he appears to bleed from the abrasions (this “bleeding” is computer-generated). The basin becomes a site of fluid exchange: blood is lost as chlorophyll is absorbed through the skin. The artist traces this blood-chlorophyll transposition to a piece of writing by the French philosopher-critic Simone Weil:

The source of man’s moral energy is outside him, like that of his physical energy [food, air, etc.]. He generally finds it and that is why he has the illusion—as on the physical plane—that his being carries the principle of preservation within itself. Privation alone makes him feel his need. And in the end of privation, he cannot help turning to anything whatever which is edible. There is only one remedy for that: a chlorophyll-conferring faculty of feeding on light [15].

Michael Joaquin Grey is interested in inventing self-organizing systems, art objects similar to artificial life [16]. Self-Organizing System: Artificial Muscle (1991) is a set of photo stills made from a videotape. They expose the hidden world of muscle generation. In a miniature test tube (a pipette), Grey placed two proteins, actin and myosin, which are the macromolecules responsible for the formation of muscle tissue. He then videotaped these proteins going through a process of self-organization in which contraction, one of the muscle’s properties, repeats itself. There is a freeze-frame quality to this work that recalls the stop-motion photographs of the nineteenth-century photographer Eadward Muybridge. Unlike Muybridge’s, however, Grey’s photo sets are not based on external locomotion. He creates a muscular system outside the body and in full view. Artificial life studies self-organizing behavior as clues to the ways in which narratives of behavior are developed and information is stored in memory.

Robert Lawrence’s Scripts for Performance (1994) are printed texts that question the use of genetically engineered life forms. They reveal deep anxiety about the sacred and personal implications of these forms in modern culture. Lawrence asks questions that have no real answers and makes statements that give no real comfort. “Ask yourself how deep you would want the hole if you were burying genetically altered bacteria. Ask yourself how deep you would want the hole to be if it were your grave” [17].

Science has always presented itself metaphorically. An experiment maps a natural process by presenting convertible data in the form of charts, numbers, or visual images. Models, diagrams, or schemas are an integral part of scientific formulation and communication. Those representations, while seemingly objective, are at the same time forays into the ways in which thinking proceeds along both traditional and experimental networks. Art’s role in this complex is to question assumptions of the visual. A more profound and difficult role for art is to make visual those aspects of systems and ideas that inherently rely on nonvisual parameters of communication. Genetics provides the maps of biochemical futures and livingforms of cellular script. It is a particularly fertile and untapped field for visual participation.

Chimeras, altered food products, and reproductive clones have become both contiguous to and continuous with cartographies of the natural world. Gene libraries and shotgun experiments use techniques of colonization and splicing to create their quarry. Language expands the uses of life, methodically constructing cyborg scenarios, and the lines between science and its fictions are constantly being reconfigured.

When Robert Rauschenberg [18] said he wanted to operate in the gap between art and life, what did he mean? The definitions of art and life are inescapably vague, slippery. Is a virus a living entity? Is a genetically altered organism in some way a work of art? Do we intuitively grasp the ways in which both culture and science operate outside of the laboratory and spill over into our lives. However, this proposition does not necessarily provide answers. Instead it merely signals the issues and problems to be addressed in the contemporary theoretical domains of art, science, and culture.

Notes and References

1. Webster’s Ninth Collegiate Dictionary. 1989. All definitions are based on this text unless otherwise noted.


5. Gina Kolata, “Researcher Clones Embryos of Human in Fertility Effort,” The New York Times, 24 October 1993. Not considered a technical feat, this procedure was developed as part of an in vitro fertilization technique by Robert Stillman at George Washington University. He made several embryos from one by physically dividing the embryo several times. Each divided embryo would then develop new cluster cells, allowing each to grow into an identical fetus.

6. Gina Kolata [5] enumerates several of the ethical problems posed by this procedure. She states, “One Brave New World scenario made possible by embryo cloning is that parents might be able to save identical copies of embryos so that if their child ever needed an organ transplant the mother could give birth to the child’s identical twin, a perfect match for organ donation. Or parents could keep a frozen embryo as a backup in case their child died, so that they create the perfect replacement.”


11. A, T, G, C represent adenine, thymine, guanine, and cytosine respectively. The DNA double helix is an architectural model held together by hydrogen bonds between specific pairs of bases. A and T always pair, G and C always pair.


16. See Steven Levy, Artificial Life: A Report from the Frontier Where Computers Meet Biology (New York: Random House, 1992), pp. 5–8. Levy defines artificial life or a-life as "the creation and study of lifelike organisms and systems built by humans. The stuff of this life is nonorganic matter, and its essence is information." It is aimed at the "understanding of all complex non-linear systems which are thought to be ruled by universal forces not yet comprehended." The definition of life in this system should be "gauged on a continuum, and not granted according to a binary decision." He goes on to say that "a complex system is one whose component parts interact with sufficient intricacy that they cannot be predicated by standard linear equations."

17. “These Scripts for Performance are metaphorical actions offered to viewers to encourage their participation in the conceptual completion of the work." Robert Lawrence, "Electro-Mechanical Flight Sequence: Bumper Crop," artist’s brochure for installation, Dow Building, St. Paul, MN (1994).


Suzanne Anker is a visual artist working with genetic imagery. She teaches art history and theory at the School of Visual Arts in New York City. This essay was originally written in conjunction with the exhibition Gene Culture: Molecular Metaphor in Visual Art held at Fordham College’s Plaza Gallery at Lincoln Center in New York, November 1994.

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