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SEEING AND BELIEVING: IMAGES OF HEREDITY IN BIOLOGICAL THEORIES OF CRIME*

Nicole Hahn Rafter[†]

Scientific milestones set off a search, often a struggle, for the metaphors and images that will be used to connect the findings with our daily lives.

—Eric S. Lander¹

It will be protested that reality, or the world, was there before any representation or human language. Of course. But conceptualizing it as reality is secondary. First there is the human thing, the making of representations. Then there was the judging of representations as real or unreal, true or false, faithful or unfaithful. Finally comes the world, not first but second, third or fourth.

—Ian Hacking²

The heart of all major discoveries in the physical sciences is the discovery of novel methods of representation, and so of fresh techniques by which inferences can be drawn.

—Stephen Toulmin³

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¹ Eric S. Lander, *In Wake of Genetic Revolution, Questions About Its Meaning*, N.Y. TIMES, Sept. 12, 2000, at F5.

² IAN HACKING, REPRESENTING AND INTERVENING 136 (1983).

³ Ellen K. Levy, *Contemporary Art and the Genetic Code: New Models and Methods of Representation*, 55 ART J. 20 (1996) (quoting STEPHEN TOULMIN, THE PHILOSOPHY OF SCIENCE 34 (1953)).

INTRODUCTION

Two terms are prominent in the title of this symposium: *law* and *science*. This Article adds a third term: *art*, by which I mean any graphic or plastic human construction that conveys meaning visually, including charts and diagrams.⁴ Lawyers and scientists sometimes describe their work, in both substance and procedures, as the opposite of art. In this view, law and science are objective, evidence-based, and logical—certainly in comparison to the substance and processes of artistic creation, which (again in this view) are subjective, intuitive, and nonlinear. This Article argues, in contrast, that one can better understand science, and science-based law as well, by resisting the lure of simple dichotomies and reflecting on ways in which science, law, and art intersect.⁵ Art and science, in my view, borrow extensively from one another.⁶

⁴ Scholars who analyze the visual displays of science avoid the term “art,” preferring terms like “inscriptions,” “visual documents,” and “representations.” They do so for two reasons, both good. First, they want to make it clear that they are not referring to oil paintings, figurative sculpture, cathedrals, and the other artifacts usually denoted by “art.” Second, they want to differentiate between the precision of scientific representations, which (in this view) try to eliminate all connotative meanings and all but one denotative meaning, on the one hand, and the denotative and connotative richness of visual art on the other. “[S]cientific illustration,” writes Françoise Bastide, “is constructed like some military strategy, an ambush without an escape route.” Françoise Bastide, *The Iconography of Scientific Texts: Principles of Analysis*, in REPRESENTATION IN SCIENTIFIC PRACTICE 208 (Michael Lynch & Steve Woolgar eds., 1988). It is designed, in other words, to lead us to one, and only one, conclusion, and that conclusion must be both inescapable and inevitable.

These distinctions between the visual displays of art and science work best when the scientific displays consist of tables, graphs, and number-filled charts, but even a chart, as I show below, can emanate unarticulated and unintentional meanings. It is very difficult to create an image without connotative meanings. Bastide’s “ambushes” are difficult to accomplish. When one examines scientific visual displays from other eras, it becomes clear that “scientific” and “artistic” displays are not necessarily opposites but can also be conceived as points on a continuum.

⁵ The dichotomies I am speaking of here may be fundamentally dichotomies of gender. On gender in law, see, e.g., MARY JOE FRUG, POSTMODERN LEGAL FEMINISM (1992). On gender in science, see, e.g., EVELYN FOX KELLER, A FEELING FOR THE ORGANISM: THE LIFE AND WORK OF BARBARA MCCLINTOCK (1993) and DONNA HARAWAY, PRIMATE VISIONS: GENDER, RACE, AND NATURE IN THE WORLD OF MODERN SCIENCE (1989).

⁶ See Levy, *supra* note 3 (providing examples of ways in which recent discoveries in genetics have influenced the fine arts); see also BARBARA MARIA STAFFORD, ARTFUL SCIENCE (1994) (providing histories of the interdependence of science and art); BARBARA MARIA STAFFORD, BODY CRITICISM (1991) (same); BARBARA MARIA STAFFORD, GOOD LOOKING (1996) (same); see also Robert Michael Brain, The

Moreover, they have the same goals: to bring order from chaos, to reveal new meanings, and to improve the quality of life.

Those who insist on an absolute divide between science and art usually do so because they picture science as an activity that maps or models an underlying reality, a world "out there" that can be apprehended directly (if not always easily). In contrast to this realist position is the constructivist view, according to which even science apprehends the world through representations, and all forms of knowing require constructions. Without going into this epistemological debate,⁷ I will note that most historians of science (as well as many scientists) take the constructivist position, arguing that instead of asking how well an image represents "reality," one should instead investigate the historical circumstances and the visual and discursive strategies that make some representations persuasive at particular moments in time. Each generation's representational strategies seem more objective, more realistic, more accurate than those of the previous era, but that may be due not to a tighter grip on an underlying reality but rather to the power of the new strategy and its fit with the historical moment.

In fact, without representational strategies—"art"—there is no science. What scientists do is to gather masses of data and reduce them to summary form, in graphs, formulas, photographs, alphabetical symbols, and so on. We know about DNA, for example, through tinkertoy-like models of the double helix and through computer-generated images. Science expresses itself through images and other forms of representation.

Yet some scientific displays are more persuasive than others. Seeing can lead to believing. We do not believe everything we see, but persuasive images can encourage us to accept the validity or reality of the object that is represented. The study of scientific iconography aims at understanding why

Graphic Method: Inscription, Visualization, and Measurement in Nineteenth-Century Science and Culture (1996) (unpublished Ph.D. dissertation, University of California, Los Angeles); Pauline Sargent, *Imaging the Brain, Picturing the Mind: Visual Representation in the Practice of Science* (1997) (unpublished Ph.D. dissertation, University of Minnesota).

⁷ For more on the debate, see Paul Tibbetts, *Representation and the Realist-Constructivist Controversy*, in *REPRESENTATIONS IN SCIENTIFIC PRACTICE*, *supra* note 4, at 69.

certain visual displays have a “unique advantage” in a given “rhetorical or polemical situation.”⁸ It analyzes scientific representations for the sources of their cognitive and emotional power. It can also reveal the social and legal implications that are sometimes inherent in scientific images.

To probe the interrelationships among science, art, and law, this Article examines images of heredity in biological explanations of crime. Specifically, it concentrates on the images of two biological explanations, the nineteenth century theory of degeneration and the early twentieth century equation of “feeble-mindedness” or mental retardation with criminality. Images of heredity, I try to show, can imply specific social policies—which is where law becomes relevant. In conclusion, this Article briefly discusses DNA and current biological explanations of crime.

I. EARLY BIOLOGICAL THEORIES OF CRIME

Before turning to late nineteenth century degeneration theory, I will briefly review two even earlier biological theories of crime. This background material will provide a historical context for the discussion of degeneration theory. It will also illustrate ways of thinking about relations among science, art, and law in biological theories of crime.

A. *Moral Derangement*

The idea that people can be born bad goes back to the Old Testament and its concept of original sin, which the Bible explains through the story of the fall from the Garden of Eden. This theological explanation of evil-doing prevailed until the late eighteenth century, when scientists in Europe and the United States began translating it into scientific terms. In this country, Dr. Benjamin Rush, a prominent Philadelphian and signer of the Declaration of Independence, was the first to propose a biological explanation for the behavior of people who

⁸ Bruno Latour, *Drawing Things Together*, in REPRESENTATION IN SCIENTIFIC PRACTICE, *supra* note 4, at 19, 36.

seem "morally deranged" or unable to obey the law.⁹ Around 1800, English and French alienists embarked on similar work. Although Rush presented no visual displays, he did use image-rich narratives to illustrate his points.

First Rush identified an aspect of the mind, the "moral faculty," which he defined as the "capacity in the human mind of distinguishing and choosing good and evil."¹⁰ Then he explained that "in all . . . cases of innate, preternatural moral depravity, there is probably an original defective organization in those parts of the body, which are occupied by the moral faculties of the mind."¹¹ In other words, compulsive criminality is probably caused by a birth defect in the part of the brain that controls morality. To exemplify moral derangement, Rush described a Frenchman, Servin, who was brilliant in philosophy, mathematics, and languages but "treacherous, cruel, cowardly, deceitful, a liar, a cheat."¹² Fittingly, Servin "expired with the glass in his hand, cursing and denying God."¹³ Notwithstanding his highly developed intellect, Servin lacked ethical capacity; his moral faculty had never developed.

Rush made a distinction between total and partial moral derangement, writing that total moral derangement is extremely rare, "innate," and in all probability caused by an inborn defect. Partial moral derangement, on the other hand, is "induced" by poor nutrition and drink.¹⁴ It, too, is biological, for it involves atrophy of the moral faculty; but partial moral derangement can be cured by improving one's diet and renouncing vice, steps that restore the weakened moral faculty to full strength.

⁹ Rush wrote twice about moral derangement. The first publication, originally issued in 1786, was Benjamin Rush, *An Inquiry into the Influence of Physical Causes upon the Moral Faculty*, in BENJAMIN RUSH, *MEDICAL INQUIRIES AND OBSERVATIONS* 93 (4th ed. 1815) [hereinafter Rush, *An Inquiry*]. The second publication was Benjamin Rush, *Of Derangement in the Moral Faculties*, in BENJAMIN RUSH, *MEDICAL INQUIRIES AND OBSERVATIONS, UPON THE DISEASES OF THE MIND* 357 (1812) [hereinafter Rush, *Of Derangement*].

¹⁰ Rush, *An Inquiry*, *supra* note 9, at 95.

¹¹ Rush, *Of Derangement*, *supra* note 9, at 360.

¹² Rush, *An Inquiry*, *supra* note 9, at 99.

¹³ *Id.*; see also Rush, *Of Derangement*, *supra* note 9, at 358.

¹⁴ Rush, *Of Derangement*, *supra* note 9, at 358, 360.

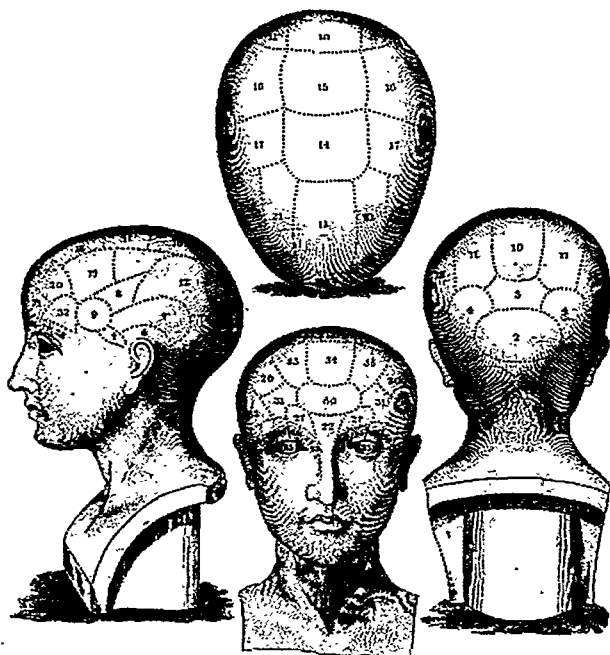
B. *Phrenology*

Rush's work helped usher in the next phase in biological theories of crime, a phase associated with the early and mid-nineteenth century science (or, if you prefer, pseudoscience) of phrenology. Extending Rush's ideas, phrenologists made the first systematic efforts to identify biological causes of crime and present their science visually (See Figure 1). According to Franz Joseph Gall and other phrenologists, each of our mental abilities is located in a separate part of the brain and functions independently, in relative isolation from the others.¹⁵ One of the brain's "faculties" or "organs" can be normal while another lies dormant or atrophies. Phrenologists disagreed about the number of faculties and the best way to label them, but they agreed that crime results when faculties such as acquisitiveness and combativeness become disordered. Because they were unable to study the brain directly, phrenologists drew conclusions about it from the contours of the skull. That is, they assumed that the development of the brain's various faculties or organs is reflected in the skull's bumps and hollows. (Thus, critics derided phrenology as "bumpology.")¹⁶

Although the phrenological explanation of crime was biological, it was seldom hereditarian. Many (probably most) phrenologists held that criminals themselves were responsible for the decay of their moral faculties, through drink or gluttony or licentiousness. Phrenologists also believed that people born with abnormally small moral faculties could develop those organs through practice. Thus, Eliza Farnham, a fervent phrenologist and, in the mid-nineteenth century, superintendent of the women's prison at Sing Sing, read books to her inmates and brought in musicians and edifying lecturers.

¹⁵ A particularly pleasant way to learn about phrenology is to go to a website where one gets information by clicking on the various faculties of the brain at http://www.bc.edu/bc_org/avp/cas/fnart/phrenology/phrenology1.html (last visited Nov. 17, 2001).

¹⁶ See generally ROGER COOTER, *THE CULTURAL MEANING OF POPULAR SCIENCE: PHRENOLOGY AND THE ORGANIZATION OF CONSENT IN NINETEENTH-CENTURY BRITAIN* (1984).

Figure 1¹⁷

NAMES OF THE PHRENOLOGICAL ORGANS
REFERRING TO THE FIGURES INDICATING THEIR RELATIVE POSITIONS.

AFFECTIVE

I. PROPENSITIES

- 1 Amativeness
- 2 Philoprogenitiveness
- 3 Concentrativeness
- 4 Adhesiveness
- 5 Combativeness
- 6 Destructiveness
- + Alimentiveness
- 7 Secretiveness
- 8 Acquisitiveness
- 9 Constructiveness

II. SENTIMENTS

- 10 Self-esteem
- 11 Love of approbation
- 12 Cautiousness
- 13 Benevolence
- 14 Veneration
- 15 Firmness
- 16 Conscientiousness
- 17 Hope
- 18 Wonder
- 19 Ideality
- .. Unascertained
- 20 Wit or Mirthfulness
- 21 Imitation

INTELLECTUAL

I. PERCEPTIVE

- 22 Individuality
- 23 Form
- 24 Size
- 25 Weight
- 26 Colouring
- 27 Locality
- 28 Number
- 29 Order
- 30 Eventuality
- 31 Time
- 32 Tune
- 33 Language

II. REFLECTIVE

- 34 Comparison
- 35 Causality

¹⁷ GEORGE COMBE, *ELEMENTS OF PHRENOLOGY* (3d ed. 1828).

Exposure to such ameliorating influences, Farnham believed, would help restore the prisoners' diseased faculties to normality.¹⁸

Some phrenologists also provided an hereditarian explanation for crime, but none showed much interest in demonstrating intergenerational transmission or in fathoming how it might occur. For instance, the immensely popular phrenologist Johann Gaspar Spurzheim argued that "the laws of hereditary descent" greatly influence character.¹⁹ Putting forth a very early suggestion for the eugenic control of crime, Spurzheim went so far as to propose that those "whose actions are stigmatized by crimes or disorderly living, be prevented, as much as possible, from propagation."²⁰ But even Spurzheim held that environmental factors such as "ignorance, idleness, intemperance, and poverty . . . are the principal causes of crime,"²¹ and like other phrenologists, he showed little curiosity about the mechanisms of heredity.

Art and science converged in the phrenologists' model heads. These busts, many fashioned from porcelain, were common sights in the first half of the nineteenth century. Some were used to teach the doctrine, others to diagnose character; miniature heads decorated the tops of canes and served as desktop inkwells. The heads literally embody the science. Seeing them, and the secrets of mental functioning that they seemed to reveal, made the science more comprehensible for viewers, and hence more plausible.

In addition, the heads faintly imply the legal doctrine of diminished responsibility: If behavior is controlled by faculties of the brain, and if those faculties can go awry without the individual's knowledge, then how can a person be held fully responsible for his or her behavior? Phrenologists were the first scientists to endorse the medical model of criminality as a sickness or disease. From this interpretation followed important policy conclusions about criminal responsibility. One is that physicians, as well as judges, should participate in legal

¹⁸ NICOLE HAHN RAFTER, *PARTIAL JUSTICE: WOMEN, PRISONS, AND SOCIAL CONTROL* 17-18 (1990).

¹⁹ JOHANN GASPAR SPURZHEIM, *EDUCATION: ITS ELEMENTARY PRINCIPLES, FOUNDED ON THE NATURE OF MAN* 37 (12th ed. 1883) (1847).

²⁰ *Id.* at 274.

²¹ *Id.*

decision making. Another is that criminals should be treated as well as punished. A third conclusion is that we should strive toward early detection and training of youth with behavioral problems, to prevent crime in the future. Phrenological heads incorporate these scientific and legal meanings.

In sum, phrenologists developed a systematic, biological explanation for all human behavior, including law-breaking. Their doctrine was scientific in that it was non-theological, empirical, and verifiable. Phrenologists became adept at presenting their doctrine visually, creating vivid artifacts that conveyed their science and led to certain legal and policy conclusions. However, these artifacts said nothing about heredity, for phrenology, though biological, was fundamentally a non-hereditarian explanation of human actions. Demonstrations of heritability became the chief contribution of the next biological theory of crime, that of degeneration.

II. DEGENERATION THEORY: CA. 1870-1910

To understand how degeneration theory took hold in the United States, how it differed from phrenology, and how it came to develop its distinctive scientific methodology, the best place to start is with Richard L. Dugdale, the New York City merchant who, in 1877, published *"The Jukes": A Study in Crime, Pauperism, Disease and Heredity*.²² In the early 1870s, Dugdale volunteered to do some research for the Prison Association of New York. Traveling upstate to Ulster County, he pored over the records of local jails, courthouses, and poorhouses. When he noticed that the same last names cropped up in various records, Dugdale began making genealogical notes. Eventually he dubbed his most numerous clan "the Jukes," using the pseudonym, he explained, partly "because there are worthy people among them who must be protected from aspersion" and partly "because there are forty-two family

²² RICHARD L. DUGDALE, *"THE JUKES": A STUDY IN CRIME, PAUPERISM, DISEASE, AND HEREDITY; ALSO FURTHER STUDIES OF CRIMINALS* (1877). For background information and a fuller view of degeneration theory in the United States and Europe, see *DEGENERATION: THE DARK SIDE OF PROGRESS* (Edward J. Chamberlin & Sander L. Gilman eds., 1985); DANIEL PICK, *FACES OF DEGENERATION: A EUROPEAN DISORDER, C. 1848-C. 1918* (1989); and NICOLE HAHN RAFTER, *CREATING BORN CRIMINALS* 148 (1997).

names included in the lineage, which, for convenience of treatment, require to be reduced to a generic appellation."²³

The procedure of reducing forty-two families to one can be questioned on scientific grounds, but as an aesthetic move, it was brilliant. It enabled Dugdale to create an immense family tree that was absolutely riveting in what it said about the intergenerational transmission of crime and disease. Dugdale's genealogical imagery was so potent and so seemingly scientific that few (if any) contemporaries questioned the validity of his genealogical sleight of hand.

Tracing the Jukes back for seven generations, Dugdale placed a sire, Max, at the head of the family tree, thus creating, conceptually, a perfect pyramid. Further research, including interviews with elderly residents of the area, demonstrated that Max's progeny had included 1,200 bastards, beggars, murderers, prostitutes, thieves, and syphilitics. Dugdale tells us how he hit upon the genealogical method to present his findings. Statistical summaries, he felt, would wash out individual differences and obscure "the *sequence* of social phenomena."²⁴ He wanted a method that would reveal "socio-dynamics." By "adding the element of time and carefully recording the order of events," Dugdale concluded, he might "discover if there is a law in the evolution of crime."²⁵ (Darwin had published *The Origin of Species*²⁶ about fifteen years earlier, bringing a certain *éclat* to the discovery of evolutionary laws.) Thus Dugdale initiated the genealogical method of research and reporting that became characteristic of degenerationists, a method that involved entering notations of negative traits directly on family trees. He enabled readers to visually grasp the effects of degeneracy over time.

Because Dugdale's fold-out Jukes charts are too massive to reproduce on a single page, I have used a much simpler image from S.A.K. Strahan's book on *Marriage and Disease*,²⁷ to indicate the genealogical method generally (See Figure 2). I have also typed up an excerpt from the top left corner of Dugdale's Chart III (See Figure 3) which shows the legitimate

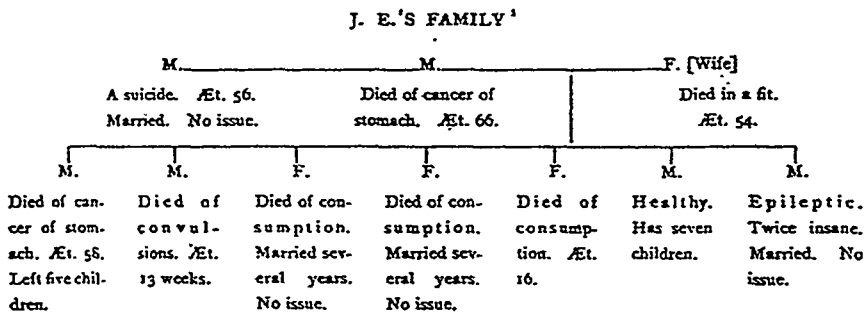
²³ DUGDALE, *supra* note 22, at 7.

²⁴ DUGDALE, *supra* note 22, at 11 (emphasis added).

²⁵ DUGDALE, *supra* note 22, at 11-12.

²⁶ CHARLES DARWIN, *THE ORIGIN OF SPECIES* (Greg Suriano ed. 1998).

²⁷ S.A.K. STRAHAN, *MARRIAGE AND DISEASE* (1892).

Figure 2²⁸

¹ Dr. S. A. K. Strahan, *loc. cit.*, p. 49.

²⁸ This chart, "J.E.'s Family," has itself accreted a genealogy. First published in S.A.K. Strahan's *MARRIAGE AND DISEASE* (1892), it was reprinted in W. DUNCAN MCKIM, *HEREDITY AND HUMAN PROGRESS* 89 (1900). From there it was again reprinted in RAFTER, *supra* note 22, at 148, the site from which I have borrowed it for this paper.

Figure 3²⁹

Excerpt from “*The Jukes*,” Chart III. The Legitimate and Illegitimate Posterity of Bell Juke, with the Persons they Married.

Among the progeny of Max Juke were two sons who married two of six sisters. Dugdale was able to trace the genealogies of five of the sisters, one of whom was Bell Juke. Thus Bell was Max’s daughter-in-law and not a blood relative.

GENERATION 2	GENERATION 3	GENERATION 4
<p>Bell Juke Farm labor; harlot before marriage; had 3 illeg. black children and 1 white; not industrious; no property; received o. relief; temperate; not criminal; d. 1832.</p> <p>m. Common laborer; revolutionary soldier; not industrious; no property; received pension; also o. relief; no criminal; temperate.</p>	<p>1. Farmer; mulatto; industrious; temperate; acquired property; intelligent, manly, and “the best of his generation”; no criminal; twice married; died about 1820.</p> <p>m. Industrious, temperate; healthy; mulatto; cohabited; no o. relief.</p> <p>2d wife; no particulars.</p>	<p>Had 2 boys and 3 girls by first wife, but the children did not do so well as the parents. Had 1 boy and 1 girl by 2d wife; the son got frozen to death when drunk; these children all married colored people.</p>

NOTE: The original of the chart excerpted here goes through 6 generations and has details on all 8 children of Bell Juke. It has details on about 125 people in all and also gives cross-references to people described in other tables.

²⁹ Dugdale, *supra* note 22, at chart III.

and illegitimate posterity of one of Max's daughters-in-law, Bell Juke, in generations three and four. This excerpt illustrates how Dugdale himself presented data. He worked from left to right through the generations, giving biographical details for each person. As one reads from left to right and down the fold-out charts, the negative details accumulate, becoming especially thick in generations four and five but thinning out in generation six.

The physicians and early social scientists who developed degeneration theory incorporated a basic tenet from phrenology: the idea that acquired characteristics can leave their mark on the human body. According to the degenerationists, individuals can devolve in the course of their own life span. Self-abuse and excess lead to degeneration, a weakened physical condition that in turn weakens one's moral capacity and thus leads to crime and other social problems. But degenerationists went beyond their phrenological forebears in their concern with heredity. These theorists taught that degeneracy, or the tendency to devolve, is passed on through the generations. Dugdale became famous because he seemed to demonstrate this theory scientifically.

Degeneration theorists spoke of degeneracy as an invisible attribute of the "germ plasm" or "blood," and they reasoned that the material of heredity must be mutable, since it was so obviously affected by poverty, intemperance, and other environmental influences. This view of bad heredity as a plastic and malleable phenomenon encouraged degenerationists to conceive of such social problems as criminality, idiocy, insanity, and pauperism as interrelated and interchangeable, mere symptoms of an underlying decay of the germ plasm. Dugdale folds this assumption of interchangeability into his Juke charts. He also seems to prove the assumption, when he shows, for example, that a harlot³⁰ like Bell Juke, who marries a man who is lazy, will have grandchildren who drink and marry "colored people." Conceiving of the various social problems as mere outer signs

³⁰ "Under the heading of harlots are included all women who have made lapses, however seldom, and the term will be used to include cases of imprudence rather than lust, for experience teaches that many women who lapse are by no means lost, recovering themselves and leading subsequent reputable lives." DUGDALE, *supra* note 22, at 17.

of the degenerative tendency, Dugdale and other degenerationists naturally searched for connections among idiots, the insane, paupers, and criminals. They did not invent genealogical record keeping, but they were the first scientists to systematically apply that method to the study of crime.³¹

Dugdale's *"The Jukes"* became one of the most influential sociological studies in U.S. history. Read (or at least skimmed) by welfare workers, institutional superintendents, clergymen, and the leaders of "scientific charity," *"The Jukes"* profoundly affected policy makers in this country and in Europe. It succeeded because it was visually persuasive. As prose, *"The Jukes"* is almost incomprehensible, and the welter of detail in the charts is indigestible. As images, however, the charts are crystalline and galvanizing, a form of visual rhetoric that enables readers to picture degenerate germ plasm coursing through the generations.

Dugdale himself refused to draw despairing conclusions from his study. He and others who continued to believe in the inheritance of acquired characteristics reasoned that if degenerates started obeying the laws of good health and morality, they could regenerate themselves physically and ethically. Moreover (this line of reasoning continued), they could pass their improvements on to their children and grandchildren. On the other hand, if they refused to improve themselves, their line would eventually die out—as shown by the tendency of Jukes genealogies to thin out in generation six.

Dugdale cautioned that his study focused only on hereditary influences and ignored the impact of environmental factors; that it was marred by missing data; and that its findings were "purely tentative."³² Read as he wanted it to be read, *"The Jukes"* implied that crime and other social ills could be reduced through better schools and social services to the poor. Unfortunately, the charts led visually to more hereditarian and deterministic conclusions.

³¹ Darwin's work on evolution prompted development of the family tree as a means of classification. See Brent Elliott, *The Rise of Natural Classification*, 121 THE GARDEN 82-85 (1996).

³² DUGDALE, *supra* note 22, at 7.

In any case, few of Dugdale's readers paid attention to his cautions, and almost as soon as "*The Jukes*" appeared, degeneration theory began its descent into pessimistic biodeterminism. This change accelerated in the mid-1880s when Americans began learning of the work of Cesare Lombroso, the Italian physician who taught that some criminals are "born" criminals, throwbacks to an earlier stage of evolution.³³ While Lombroso's theory said nothing about the causes of such retrogressions, it encouraged Americans to conclude that degeneracy must be heritable and that it could be eliminated only through eugenic measures. For many readers, "*The Jukes*" implied legal innovations such as eugenic life sentences for all criminal degenerates, irrespective of severity of the offense.³⁴ For these readers, the book's policy implications included screening for degeneracy and eugenic measures against all those—idiots, the insane, and paupers as well as the overt law-breakers—whose bad heredity predisposed them to crime. Many of these measures would best be termed quasi-legal; at the time, charity workers could incarcerate "degenerates" for life without legislation and without what we would today consider due process, so long as they did so in the name of social protection and benevolence.³⁵

In sum, in Dugdale's work, degenerationists in this country and in Europe found the bad-family tree or pedigree study which simultaneously provided: (1) a method of research; (2) a format for presenting their findings; (3) a visual representation of their findings; and (4) proof of the theory's validity. Dugdale himself believed that environment and heredity work in tandem, a position that suggested policies of social improvement. However, later degenerationists were

³³ The most accessible English-language version of Lombroso's work remains GINA LOMBROSO-FERRERO, *CRIMINAL MAN ACCORDING TO THE CLASSIFICATION OF CESARE LOMBROSO* (Montclair, N.J.: Patterson Smith, 1972) (1911). The first Italian edition of *Criminal Man* appeared in 1876.

³⁴ Sir Francis Galton did not coin the term "eugenics" until 1883, and the term did not become familiar on this side of the Atlantic until after the turn of the century. However, Americans were using other terms to discuss and implement eugenics in the late 1870s. See FRANCIS GALTON, *INQUIRIES INTO HUMAN FACULTY AND ITS DEVELOPMENT* (New York: AMS Press, 1973) (1883). For examples of the American calls for eugenic measures, see, e.g., HENRY M. BOIES, *PRISONERS AND PAUPERS* (1893); Josephine Shaw Lowell, *One Means of Preventing Pauperism*, in NATIONAL CONFERENCE OF CHARITIES AND CORRECTION, *PROCEEDINGS* 189 (1879).

³⁵ See, e.g., RAFTER, *supra* note 22, at ch. 3.

much less inclined to credit environmental influences. For them, the next step was to discover more about the mechanisms of heredity, which brings us to Henry Herbert Goddard and the feeble-mindedness theory of crime.

III. FEEBLEMINDEDNESS THEORY: CA. 1905-1920 AND BEYOND

Intelligence testing, an apparently surefire method of identifying biological criminals, was introduced around 1910. But even earlier, American eugenicists had begun advancing a new biological theory under which the worst or born criminals are feeble-minded (mentally retarded) and "the feeble-minded" (persons with mental retardation) are by nature criminalistic.

Feeble-mindedness theory was promoted by developments in genetics. In 1900, scientists rediscovered the laws of inheritance that Gregor Mendel, an Austrian monk, had formulated through experimentation with garden peas. And early in the twentieth century, scientists rejected the idea that acquired characteristics can be inherited, replacing it with the view that chromosomal germ cells (*genes*, in today's terminology) determine heredity. Applying Mendel's rules to human inheritance and assuming that feeble-mindedness is a single, inherited trait, eugenicists reasoned that if they could prevent feeble-minded people from having children, the country would soon be rid of feeble-mindedness and crime.

One of the foremost American proponents of the feeble-mindedness theory of crime was the eugenicist Henry H. Goddard, head psychologist at the Vineland, New Jersey, Training School for Feeble-minded Boys and Girls. In 1908, during a European tour, Goddard learned that French psychologist Alfred Binet had devised a method of measuring intelligence with pencil-and-paper tests. Quickly translating Binet's tests into English and applying them, without standardization, in institutions for juvenile delinquents, Goddard found that most law breakers tested at or below the "mental age" of twelve, which he immediately concluded must be the upper limit of feeble-mindedness.

Other psychologists who administered intelligence tests in prisons and reformatories confirmed Goddard's apparently scientific evidence that weak intelligence is what ails criminals. At the same time, officials at institutions for the feeble-minded proclaimed that nearly all of their charges were inclined to criminal behavior. The feeble-mindedness theory of crime could now boast confirmation by two sets of experts. But to demonstrate the need for eugenic solutions, proponents also needed proof that feeble-mindedness is inherited. For this, they utilized the new reporting method that we see in *The Kallikak Family*³⁶ chart (Figure 4).

The new iconography was invented by Goddard himself, working in association with Charles B. Davenport, the geneticist who coordinated American eugenics research.³⁷ In 1909, Davenport appointed Goddard to a committee to study the inheritance of feeble-mindedness. Through his committee work, Goddard became familiar with Mendel's laws of inheritance. One law states that parental traits do not blend in offspring but remain discrete; some traits are dominant and other traits are recessive. Like other eugenicists, Goddard assumed that human traits, including bad temper, epilepsy, and feeble-mindedness, are transmitted as unit characters, much like height in Mendel's peas.

Because eugenicists were unable to experiment with humans, they had to fall back on pedigree studies to trace the inheritance of negative traits. Goddard dispatched eugenic field workers to investigate the genealogies of Vineland inmates, instructing them to determine the intelligence levels of long-dead ancestors. His preliminary report on these investigations, a 1911 article titled *Heredity of Feeble-Mindedness*, was apparently the first publication to use the iconography that became characteristic of early twentieth century pedigree studies.³⁸ Its symbols distill the eugenics argument to a simple visual code.

³⁶ HENRY H. GODDARD, *THE KALLIKAK FAMILY: A STUDY IN THE HEREDITY OF FEEBLEMINDEDNESS* 36 (1912) [hereinafter GODDARD, *KALLIKAK FAMILY*].

³⁷ LEILA ZENDERLAND, *MEASURING MINDS: HENRY HERBERT GODDARD AND THE ORIGINS OF AMERICAN INTELLIGENCE TESTING* 399, n.58 and accompanying text (1998).

³⁸ Henry H. Goddard, *Heredity of Feeble-Mindedness*, 3 *THE EUGENICS REVIEW* 46 (1911).

Whereas Dugdale had written names on his family trees, Goddard used squares to indicate males and circles to indicate females, presenting all members of a single generation in one row. Within each square or circle, he indicated normality with an *N* and feeble-mindedness with an *F*, thus visually conveying his assumption that *N* and *F* are dichotomous. Squares and circles marked *F* are blackened, betokening the evil of the feeble-minded. The method suggests that normal intelligence and feeble-mindedness are inherited; that they are inherited as single units; and that they are impervious to environmental influences. The charts also seem to demonstrate that the mating of two feeble-minded persons inevitably produces feeble-minded offspring. They appear to track not individuals, but heredity itself. At the time, they seemed to pull aside another of heredity's veils, exposing the underlying biological realities.

Goddard perfected this method in *The Kallikak Family*,⁴⁰ published in 1912. Written to alert the general public to the dangers of the feeble-minded, *The Kallikak Family* proceeds as a narrative, describing two branches of a single family, one good (from the Greek *kalos*) and one bad (*hakos*), but both sired by Martin Kallikak, Sr. The first branch began with Martin's liaison, in a tavern during the Revolutionary War, with "a feeble-minded girl."⁴¹ From this coupling flowed over 480 illegitimate, alcoholic, epileptic, and above all, feeble-minded and criminalistic descendants, down to Deborah Kallikak, one of Goddard's main characters. Deborah ends this half of the story biologically as well as narratively: Because she is an inmate of the Vineland institution, there will be no more bad Kallikaks. The other branch stemmed from Martin's marriage to "a respectable girl of good family"; their 496 descendants were all normal or superior in intelligence, "men and women prominent in every phase of social life."⁴² The two-branched family seemed to demonstrate, as Dugdale's monolithic Jukes family could not, that "no amount of education or good environment can change a feeble-minded individual into a normal one."⁴³ It seemed to confirm

⁴⁰ GODDARD, KALLIKAK FAMILY, *supra* note 36.

⁴¹ *Id.* at 18.

⁴² *Id.* at 29-30.

⁴³ *Id.* at 53.

scientifically that feeble-mindedness is inherited as a Mendelian recessive trait.

Acceptance of feeble-mindedness theory rapidly expanded the system of training schools for persons with mental retardation and transformed those schools into custodial eugenic institutions where inmates could be held for life. Another result was the enactment in several states of "defective delinquent" laws that enabled authorities to hold accused and convicted offenders who seemed feeble-minded for up-to-life terms, again for eugenic purposes.⁴⁴ Other consequences included the New York City Police Department's 1915 plan to train police officers to visually assess the intelligence of passers-by. Under the headline *Sleuths to Be Taught How to Differentiate Mental Defectives from Crooks*, *The New York Times* reported that:

The [Police] Commissioner figures that it is going to save his men a great deal of work if they can stand on a corner and by psychological tests tell what passer-by is the thief of yesterday If the policeman is uncertain he may march his suspect up an alley and apply the Binet test.⁴⁵

Police chief Arthur Woods reasoned that feeble-minded criminals detected in this manner could be spared the inconvenience of a trial and sent directly to "an institution for treatment or for permanent care."⁴⁶ American eugenics, like its later Nazi counterpart, was to a large extent an aesthetic doctrine masked as a science.⁴⁷

⁴⁴ RAFTER, *supra* note 22, at chs. 10-11. For more on the legal fallout of feeble-mindedness theory, see MARK HALLER, *EUGENICS* at ch. IX (1963); DANIEL J. KEVLES, *IN THE NAME OF EUGENICS: GENETICS AND THE USES OF HUMAN HEREDITY* (1985); STEVE NOLL, *FEEBLE-MINDED IN OUR MIDST* at ch. 4 (1995); STEVEN SELDEN, *INHERITING SHAME: THE STORY OF EUGENICS AND RACISM IN AMERICA* (1999); Michael Willrich, *The Two Percent Solution: Eugenic Jurisprudence and the Socialization of American Law, 1900-1930*, 16 *LAW & HISTORY REV.* 63 (1998).

⁴⁵ *Sleuths to Be Taught How to Differentiate Mental Defectives from Crooks*, *N.Y. TIMES*, October 30, 1915, at 5.

⁴⁶ NEW YORK CITY POLICE DEPARTMENT, 1916 *Annual Report* at xxvii-xxviii; see also ARTHUR WOODS, *CRIME PREVENTION* 62-64 (1918).

⁴⁷ In terms of Nazism, this point is made forcefully in *THE ARCHITECTURE OF DOOM* (First Run/Icarus Films, 1991), the Peter Cohen film that examines Nazi atrocities as an extension of Nazi aesthetics.

Advances in genetics and mental testing began undermining the feeble-mindedness theory of crime about 1915. Nevertheless, eugenicists continued endorsing it for many years. For instance, in 1934, the criminologists Sheldon and Eleanor Glueck reported that most inmates of the Massachusetts Reformatory for Women were mentally defective, recommending that such women be held for life, irrespective of their crimes.⁴⁸ As recently as 1994, Richard J. Herrnstein and Charles Murray put forth a similar theory in their book *The Bell Curve: Intelligence and Class Structure in American Life*, though they suppress the obvious eugenic conclusions.⁴⁹

In sum, the feeble-mindedness explanation of crime was on the rise even before Goddard invented the new method of representing bad heredity, but Goddard's method helped solidify the theory's appeal and fuel the American eugenics movement. Cacogenic or bad-family studies became all the rage; welfare workers throughout the country churned out charts of cacogenic families with contemptuous pseudonyms such as the Dack Family, the Happy Hickories, and the Family of Sam Sixty (which was named in honor of its progenitor's IQ) (See Figure 5).⁵⁰ Goddard's approach went beyond Dugdale's by reducing individuals to a single gene. Legally, the method led to eugenic laws such as immigration restriction and defective delinquent legislation and to pro-eugenic court decisions such as *Buck v. Bell*.⁵¹ In the area of social policy, it led to keystone cops on street corners, sizing up citizens' intelligence; to intelligence screening in public schools and the development of various "tracks" within the public education system; to visual screening of immigrants at Ellis Island, so that the "feeble-minded" could be sent back to Europe; and to sterilizations.⁵² Less directly, contempt for the feeble-minded

⁴⁸ SHELDON S. GLUECK & ELEANOR T. GLUECK, *FIVE HUNDRED DELINQUENT WOMEN* (1934).

⁴⁹ RICHARD J. HERRNSTEIN & CHARLES MURRAY, *THE BELL CURVE: INTELLIGENCE AND CLASS STRUCTURE IN AMERICAN LIFE* (1994).

⁵⁰ These are reprinted in NICOLE H. RAFTER, *WHITE TRASH: THE EUGENIC FAMILY STUDIES, 1877-1919* (1988).

⁵¹ See generally *Buck v. Bell*, 274 U.S. 200 (1927) (authorizing sterilization to prevent the transmission of feeble-mindedness); Willrich, *supra* note 44.

⁵² On sterilizations, see PHILIP R. REILLY, *THE SURGICAL SOLUTION: A HISTORY OF INVOLUNTARY STERILIZATION IN THE UNITED STATES* (1991).

Figure 5⁵³

The Family of Sam Sixty
(Kostir, 1916)

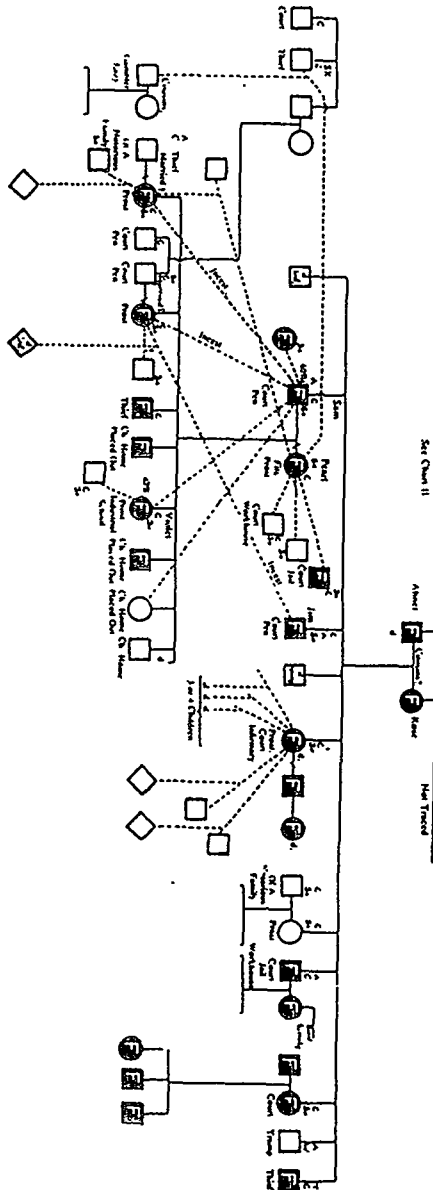


Chart I:

Explanation of the Charts: The squares indicate males and the circles females. A square turned so it rests on one corner indicates that the sex is not known. A horizontal or oblique line joining a square and a circle indicates marriage if a solid line, and illicit sexual relation, if it is a broken line. Perpendicular lines indicate descent. Thus Abner and Rose, of Chart I, were married. Sam, in turn, was married to Pearl, and had illicit relations with another woman and with four of his own daughters. The letter "F" in a square or a circle indicates the person is known to be feeble-minded. Sx. means sexually immoral; C., criminalistic; A., alcoholic; N., normal; W., wanderer or vagrant; T., tubercular; I., insane; and D., deceased.

⁵³ Mary Storer Kostir, *The Family of Sam Sixty* 1916, reprinted in Rafter, *supra* note 22, at 192.

led, in the 1940s and 1950s, to experiments at a Massachusetts "school" for the mentally retarded in which scientists from Quaker Oats and the Massachusetts Institute of Technology put radioactive materials in the inmates' breakfast cereal.⁵⁴ Those who were socially useless (so this reasoning went) might at least serve science.

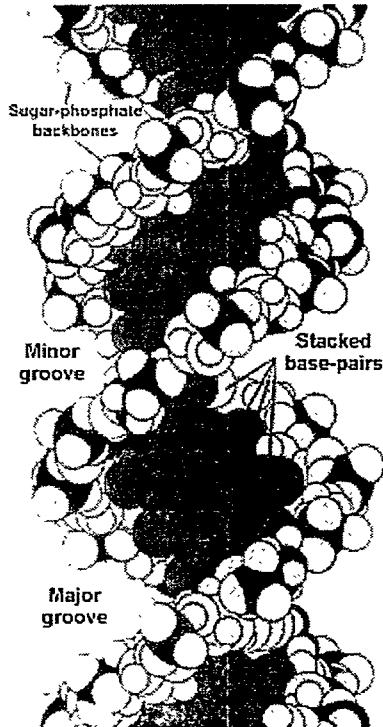
IV. BIOLOGICAL THEORIES IN THE YEAR 2001

Let us now turn to the image of the DNA double helix (See Figure 6). What can we say about this image and its implications for biocriminology?⁵⁵ The technology of computer-generated images has brought a new way of visualizing the stuff and mechanisms of heredity. Just as photography is an especially persuasive medium that creates the illusion of direct and unmediated connection with a world "out there," so too do these computer-generated images convey the illusion of objectivity and naturalism. We are tempted to believe that the computer is drawing directly from life, producing exactly what our eyes would perceive if equipped with supermagnifiers. The impression is also one of overwhelming complexity.⁵⁶ If DNA is indeed complex, and if it does indeed help determine who we are and will be, then the geneticists producing these images are creating the biggest and best surveillance machines to date, panopticons beyond Jeremy Bentham's wildest dreams. Peering at the computer screen and equipped with sufficient information, the geneticist becomes omniscient, reading our past and our future. If a geneticist can also manipulate genes, he or she also becomes close to omnipotent.

⁵⁴ Scott Allen, *MIT, Quaker Oats, Fernald Doctors Face \$60M Federal Lawsuit Over Tests*, BOSTON GLOBE, Dec. 6, 1995, at 34.

⁵⁵ I have taken the shorthand terms "biocriminologist" and "biocriminology" from Nikolas Rose, *The Biology of Culpability: Pathological Identity and Crime Control in a Biological Culture*, 4 THEORETICAL CRIMINOLOGY 5 (2000).

⁵⁶ Bruno Latour argues that the process of science is always toward simplification, toward the distillation of information into ever simpler inscriptions. Latour, *supra* note 8, at 48. In the case of computer-generated DNA images, however, we seem to be moving toward complexity.

Figure 6⁵⁷**DNA Double-Helix**

⁵⁷ <http://www.pbs.org/faithandreason/media/dna-body.html> (last visited May 9, 2000).

Like every successful new visual display, then, these DNA images "ambush" us,⁵⁸ compelling acceptance of what they seem to say. They sweep us off our feet, making it difficult to detect their representational strategies. We cannot discern, as yet, their "interpretational structures."⁵⁹ It will take a while to sort out their implications.

Nonetheless, DNA imagery already leads to several conclusions relevant to biocriminology. One is that a criminologist, trained in a field distant from that of human genetics, would have trouble even grasping the intricacies of human heredity, much less identifying genetically-determined components of criminal behavior. Second, compared to the charts of Dugdale and Goddard, the modern images seem relatively silent about the processes of inheritance. We all know that DNA has something to do with heredity, but exactly what that might be does not follow from visual inspection alone. Third, the complexity of DNA imagery suggests that courts are unlikely in the near future to abandon the concepts of free will and legal responsibility for crime, given the difficulties entailed in building a determinist argument from DNA evidence. While courts may accept a "defective-gene" defense in rare, individual cases, it is unlikely that they will abandon the free-will assumptions of Anglo-American jurisprudence. Fourth and finally, the images imply an evidentiary innovation that is already familiar, that of using DNA evidence in court to prove or disprove guilt. Overall, however, DNA images are unlikely to inspire fundamental legal change.⁶⁰

Biological theories of crime have proliferated in recent years, focusing on not just genes but a wide variety of causative factors. Some theorists have speculated about links between criminal behavior and brain anomalies, while others have attributed criminality to abnormalities of the endocrine system. Hormones were indicted by PMS (pre-menstrual

⁵⁸ See Bastide, *supra* note 4, at 208 (outlining her concept of the ambush).

⁵⁹ Steven Yearley, *The Dictates of Method and Policy: Interpretational Structures in the Representation of Scientific Work*, in REPRESENTATION IN SCIENTIFIC PRACTICE, *supra* note 4, at 337.

⁶⁰ See generally GENETICS AND CRIMINALITY: THE POTENTIAL MISUSE OF SCIENTIFIC INFORMATION IN COURT (Jeffrey R. Botkin et al. eds., 1999). Some of the specific conclusions I reach here are also reached, via a different route, by Nikolas Rose in *The Biology of Culpability*, *supra* note 55.

syndrome) theorists, who posited a correlation between menstruation and violence in women. For a while, "XYY" theorists claimed to have established an association between men with an extra Y chromosome and violent behavior. More recently, crime has been tied to deficits in levels of the neurotransmitter serotonin and to unusually small amounts of gray matter in the brain. This list could go on for pages, as indicated by the index to recent issues of *Crime Times* (See Figure 7), a journal devoted to the "biological causes of criminal, violent, and psychopathic behavior."⁶¹

Biocriminologists seldom mention hereditary factors these days. In the *Crime Times* index, for example, non-genetic biological factors such as fetal alcohol syndrome, head injuries, seizure drugs, testosterone, and lead poisoning are discussed far more frequently than genes. Perhaps current biological theorists, having caught sight of the double helix, have decided to keep their distance. In any case, most of them remain silent on the subject of genetic determinism.

The most sophisticated of current biological theories of crime echo themes from the field of human behavioral genetics. Both biocriminologists and behavioral geneticists attribute individual variations in behavior to a combination of genetic and environmental factors, giving particular environmental weight to early childhood experiences. Avoiding the sweeping determinism of the past, members of both groups speak of probabilities and of people who are "genetically at risk." David Rowe and Wayne Osgood, two of the most respected current biocriminologists, could be speaking for behavioral geneticists when they write that "most traits are related to many genes rather than just one"; that "genetic factors can only be the first stage of any causal sequence leading to social behaviors"; and that "genetic defects . . . are particularly implausible for explaining a phenomenon as widespread as illegal behavior."⁶² In like manner, Diana Fishbein, a theorist who writes about female aggression, cautiously explains that "biological and medical conditions . . . may interact with social circumstances

⁶¹ See *Crime Times*' Internet site at <http://crimetimes.org/issues.htm>.

⁶² David Rowe & D. Wayne Osgood, *Heredity and Sociological Theories of Delinquency: A Reconsideration*, 49 AM. SOC. REV. 526, 527 (1984).

Figure 7⁶³**CRIME TIMES--Article Index**

(from <http://www.crime-times.org/issues.htm>, downloaded 8 September 2000)

Volume 5, No. 4, 1999

ANOTHER STUDY LINKS CRIMINALITY, MOTHERS' SMOKING
 BOOK REVIEW: A MIND TO CRIME
 BRAINWAVE TESTS REVEAL ABNORMALITIES IN PSYCHOPATHY, CONDUCT DISORDER
 DOPAMINE ABNORMALITIES LINKED TO VIOLENCE
 DYSLEXIA LINKED TO INCREASED PSYCHOLOGICAL IMPAIRMENT IN PRISONERS
 HAS LEGALIZED ABORTION REDUCED CRIME RATES?
 MALNUTRITION BEFORE BIRTH LINKED TO ANTISOCIAL BEHAVIOR
 MATERNAL HYPOTHYROIDISM LOWERS BABIES' IQs
 MURDERERS OFFER CLUES ABOUT NATURE, NUTURE
 QUOTABLE: WILLIAM RASPBERRY
 RETHINKING 'SENSELESS' VIOLENCE: A NEW CONCEPT
 SMARTER, NICER MICE RAISE POSSIBILITY OF GENE THERAPY FOR IQ, BEHAVIOR
 VERBAL DEFICITS LINKED TO DRUG, ALCOHOL ABUSE

Volume 6, No. 1, 2000

ADHD: NEW EVIDENCE OF CRIME LINK; ADVOCACY GROUP CALLS FOR RESEARCH ON TOLE OF DIET, FOOD ADDITIVES
 AFFECTIVE DISORDERS AGAIN LINKED TO CRIME
 ANOTHER POVERTY RISK: DO PESTICIDES THREATEN INNER-CITY CHILDREN'S BRAINS?
 CAN DIET CHANGE IQ?
 DAMASIO: EARLY DAMAGE TO PREFRONTAL CORTEX LINKED TO AMORAL BEHAVIOR
 FAS/CRIME LINK: MORE EVIDENCE SEEN
 FEMALE AGGRESSION: ANIMAL STUDY SHOWS ROLE OF SEROTONIN
 FENFLURAMINE 'CHALLENGE' ADDS TO EVIDENCE OF SEROTONIN'S ROLE IN AGGRESSION, IMPULSIVITY
 QUOTABLES: MICHAEL RUTTER, KATHLEEN M. HEIDE, NATIONAL INSTITUTE OF ENVIRONMENTAL HEALTH SCIENCES
 STILL MORE BAD NEWS ABOUT MATERNAL SMOKING
 'SWEET TOOTH,' CRAVING FOR ALCOHOL LINKED

Volume 6, No. 2, 2000

A FORMULA FOR HIGHER IQ?
 ANTISOCIAL BEHAVIOR, EXECUTIVE FUNCTION DEFICITS MAY BE LINKED
 CONDUCT DISORDER: RESEARCH ON TWINS SHOWS STRONG INFLUENCE OF GENES
 FAS: HOW ALCOHOL KILLS BABIES' BRAIN CELLS
 LEFT HEMISPHERE EEG ABNORMALITIES, VIOLENCE LINKED
 MRI: ANTISOCIAL PERSONALITY DISORDER, PREFRONTAL DEFICITS LINKED
 QUOTABLE: ROBERT HATHERILL
 SALIVA LEVELS OF HORMONE CORRELATE WITH EARLY, PERSISTENT AGGRESSION
 SCHOOL STUDY: SUPPLEMENTATION DECREASES DELINQUENT BEHAVIORS, RAISES IQ

⁶³ The full index can be found on *Crime Times'* Internet site at <http://crime-times.org/issues.htm>. My thanks to Simon Cole for guiding me to this resource.

to explain some forms of female aggressive behavior."⁶⁴ These probabilistic statements are more congruent with the complexity of DNA imagery than are single-factor explanations.

Not all criminologists are as cautious as Rowe and Osgood, however, and as Dorothy Nelkin and Susan Lindee have observed, genetic images are already being used to underscore human differences, justify denials of rights, and excuse inequalities.⁶⁵ Lured by the gratifications of media attention, pop criminologists may soon come up with recommendations for genetic engineering—knock out an aggression gene here, rearrange a sequence there, and presto! a crime-free society. Or they might propose cloning law-abiding citizens.

CONCLUSION

Science expresses itself through art—images and other forms of representation that summarize scientific data and often have considerable persuasive power. Multi-layered in their meanings, visual displays can appeal to us aesthetically, cognitively, emotionally, and symbolically. They may tacitly validate the science, or at least encourage us to accept it. Moreover, some scientific images hint at or imply specific legal or social courses of action.

I have been tracing the history of representations of heredity in biological theories of crime. From an Olympian perspective, one can see that this history began in the eighteenth century with scientists searching the outer body for signs of abnormality or criminality and that it has ended up, today, with scrutiny of the genes. The trajectory has been from outer to inner; from analyses of the entire body to minute inspections of a strand of DNA; and from popular sciences that almost anyone could practice (as in diagnoses of phrenological bumps) to a highly specialized technology that few can

⁶⁴ Diana H. Fishbein, *The Psychobiology of Female Aggression*, 19 CRIM. JUST. & BEHAV. 99, 100 (1992).

⁶⁵ See generally Dorothy Nelkin & M. Susan Lindee, *The Media-ted Gene: Stories of Gender and Race*, in *DEVIANT BODIES* 387 (Jennifer Terry & Jacqueline Urla eds., 1995).

understand, much less participate in. But as the tide of opinion turns away from one explanation and toward another, the newest theory is almost always embedded in visual displays that have a self-validating quality. They seem “just right”—truer or more accurate models of “reality” than the representations they bid to replace.

Computer-generated images of DNA are unlikely to be the final exhibit in this parade. I would like to see the development of a history of scientific iconography that relates scientific images, including criminological images, to their social contexts. Moreover, while visual sophistication may be increasing, we still lack answers to important questions. What are our assumptions about the boundaries between science and art, and what are the origins of these assumptions? When does science (or art) become propaganda? What *is* science, and how does one recognize it when one sees it? If we hope to guard against the excesses into which biocriminology has led in the past, then we will do well to analyze ways in which science and art intersect—sometimes with the law in tow.

