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FOREWORD

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In April of 2005, a group of scientists, scholars, policymakers, and legal professionals gathered at Duke Law School to discuss the implications of attempts to introduce behavioral biology evidence into the criminal justice system. The conference, entitled "The Impact of Behavioral Genetics on the Criminal Law," was sponsored by *Law and Contemporary Problems*; the Institute for Genome Science and Policy's Center for Genome Ethics, Law, and Policy; and the Science and Technology Law Section of the American Bar Association. The articles published in this symposium reflect the presentations and commentary from that conference and demonstrate the multidisciplinary nature of the issues that arise from introducing behavioral genetics evidence into criminal proceedings.

The first two articles of the volume serve as a primer on the meaning of behavioral genetics, an introduction to recent scientific strides in the field and to its limitations in explaining the causes of human behavior. In the first article, *Behavioral Genetics: The Science of Antisocial Behavior*, scientists Laura A. Baker, Serena Bezdjian, and Adrian Raine discuss the methodologies and results of behavioral genetics studies focusing on such traits as antisocial behavior, aggression, and behaviors associated with criminal conduct.[1] Their article describes in detail the classic methods as well as more recent research designs of behavioral genetics studies, along with the various assumptions, strengths, and weaknesses of each approach. It discusses the leading scientific

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1. Laura A. Baker, Serena Bezdjian & Adrian Raine, *Behavioral Genetics: The Science of Antisocial Behavior*, 69 LAW & CONTEMP. PROBS. 7 (Winter/Spring 2006).

research in behavioral genetics that addresses the genetic and social risk factors contributing to antisocial personality disorder. The article further shows that behavior arises from a complex interaction between genetic and environmental factors, dispelling the notion of behavioral genetics as a study of genetic determinism. Finally, the authors explain that although the study of human behavioral genetics may elucidate the genetic and environmental factors driving behavioral differences among individuals in a population, it cannot explain the causes of behavior in any specific individual or any specific act by an individual.

Jonathan Kaplan's article, *Misinformation, Misrepresentation, and Misuse of Human Behavioral Genetics Research*, offers a more skeptical approach to the results of the vast array of scientific studies attempting to decipher the relationships among genes, behavior, and development.[2] He discusses the limitations of human behavioral genetics studies, highlighting the research limitations inherent in studying humans and the narrow policy and legal applicability of results arising from studying variation in human behavior. His article provides an important cautionary message regarding mis- or over-interpretation of research results from behavioral genetics studies. He concludes that, from a scientific perspective, behavioral genetics provides little relevant information regarding defendants in the criminal justice system.

The article by Owen D. Jones, and the one by Brent Garland and Mark S. Frankel then place behavioral genetics research into a broader scientific, legal, and policy context. Jones's article, *Behavioral Genetics and Crime, in Context*, situates the discussion of behavioral genetics by grounding it within broader areas of the law and other fields of behavioral biology.[3] He explains the relationship between behavioral genetics and other disciplines in behavioral biology, highlighting how the discussions and conclusions in this volume fit within the broader debate. He also aptly notes that the criminal law is but one of many fields of law potentially affected by behavioral genetics. He compares the potential contributions of behavioral genetics and behavioral ecology and suggests how the diverging efforts could be joined. He then offers a foundation for the rest of the articles in the volume by introducing principles that have gained consensus among scientists and commentators, including a recognition of the complexity of behavior, the rejection of genetic determinism, and the critically important agreement that the science of behavioral genetics and its introduction into the criminal law does not implicate or justify Social Spencerism or eugenics. Finally, Jones notes that genetic factors that contribute to behavioral differences in a population could be treated the same as environmental factors, despite the incongruity in how each is currently received.

In *Considering Convergence: A Policy Dialogue About Behavioral Genetics, Neuroscience, and Law*, Brent Garland and Mark S. Frankel emphasize the

2. Jonathan Kaplan, *Misinformation, Misrepresentation, and Misuse of Human Behavioral Genetics Research*, 69 LAW & CONTEMP. PROBS. 47 (Winter/Spring 2006).

3. Owen D. Jones, *Behavioral Genetics and Crime, in Context*, 69 LAW & CONTEMP. PROBS. 81 (Winter/Spring 2006).

timeliness of this volume by calling for scientists, lawyers, courts, and lawmakers to begin the critical dialogue about the implications of scientific discoveries and technological advances on the criminal law.[4] They also stress the need to discuss the behavioral sciences now, before their use in the criminal justice system becomes unchecked. Garland and Frankel contribute the perspective of the American Association for the Advancement of Science (AAAS) and put the issues discussed in this volume into the context of public policy dialogues about both behavioral genetics and the neurosciences. Their article demonstrates the natural parallels between neuroscience and behavioral genetics and explains their predictions for the broad ways in which such evidence may be used in the criminal law: in mitigation of criminal responsibility for defendants addicted to drugs and alcohol, and in "preformal" situations, that is, those occurring before criminal charges are filed. Through their discussion of the shared history of neuroscience and behavioral genetics, the actual and potential use of these disciplines, and the differences between the two fields, Garland and Frankel provide a powerful and compelling case for the urgency of addressing the implications of behavioral sciences in the criminal law.

Building upon this foundation, the following articles in the volume focus on particular issues arising from the study of behavioral genetics and the criminal law. The article I co-authored with James E. Coleman Jr. and the one by Stephen J. Morse opine that irrespective of its scientific utility, behavioral genetics has little relevance to the concept of criminal responsibility. In *Genetics and Responsibility: To Know the Criminal from the Crime*, Coleman and I discuss the attempted use of behavioral genetics evidence in criminal cases, and why, as a matter of criminal responsibility theory, such evidence has and should have a limited evidentiary role.[5] Our discussion focuses first on claims advanced by defendants using behavioral genetics evidence, including attempts to introduce genetic predispositions to negate the voluntary act requirement or mens rea, to satisfy the requirement of mental disease or defect for insanity defenses, and as mitigation during sentencing. We then explain that in spite of its potential scientific utility, behavioral genetics has limited applicability to criminal responsibility as a matter of criminal law theory. In so doing, we explain the meaning and characteristics of the concepts underlying criminal responsibility, with a detailed consideration of the components of criminal liability and the operation of the reasonable person standard in justifications and excuses to negate criminal liability. Using behavioral genetics as a tool, we offer a coherent approach to understanding criminal responsibility and its limiting characteristics, and demonstrate why behavioral genetics

4. Brent Garland & Mark S. Frankel, *Considering Convergence: A Policy Dialogue About Behavioral Genetics, Neuroscience, and Law*, 69 LAW & CONTEMP. PROBS. 101 (Winter/Spring 2006).

5. Nita A. Farahany & James E. Coleman Jr., *Genetics and Responsibility: To Know the Criminal from the Crime*, 69 LAW & CONTEMP. PROBS. 115 (Winter/Spring 2006).

evidence should thereby be rejected under the current understanding of criminal responsibility.

Stephen J. Morse's article, *Addiction, Genetics, and Criminal Responsibility*, focuses more specifically on drug and alcohol addiction, with a similar conclusion about the limited relevance of behavioral genetics evidence to criminal responsibility.[6] In light of the abundance of studies focusing on the genetic contributions to addiction, Morse develops a meaningful background on the legal and scientific images of behavior, the disease concept of addiction, and the aspects of addiction for which a person may be held legally accountable. His article is essential reading for those seeking to understand the implications of behavioral genetics research regarding compulsive behavior. He explains the features of addiction that may be relevant to excuses in the criminal law, whether addicts are responsible for their own addiction and why new evidence regarding biological contributions to compulsion and craving do not negate a defendant's accountability in the criminal law. Morse makes an important contribution to the continuing dialogue about addiction by introducing several policy proposals for how such evidence could be used to reduce addiction and its resulting criminal behavior.

With Deborah W. Denno's *Revisiting the Legal Link Between Genetics and Crime*, the volume shifts to explore some of the additional legal and social issues that arise from the study of behavioral genetics and its introduction into the criminal justice system. Denno provides an invaluable update to her earlier work detailing the potential implications arising from the high-profile case of Stephen Mobley, who sought to introduce a then-cutting-edge theory that violence could be based on a genetic or neurochemical abnormality as mitigating evidence during capital sentencing.[7] Denno discusses the original controversy concerning the use of genetic evidence at the time of Mobley's trial, including such concerns as the potential abuse of such information, its relationship with concepts of free will, the impact of such information on jurors, and the potential stigma associated with genetic predispositions. She then reevaluates those concerns in light of the significant scientific progress that has been made in the field since *Mobley*. The review of cases in her article affords a complementary perspective to the cases that Coleman and I discuss by looking at the procedural posture of the cases when such information was introduced and the procedural hurdles leading to rejection of such evidence by the courts. Based on her review, she explains that in spite of her earlier predictions, the role of behavioral genetics in the criminal law still remains largely theoretical and has yet to gain widespread acceptance.

The next several articles address the implications and limitations of ongoing behavioral genetics research. David H. Kaye offers a comprehensive discussion

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6. Stephen J. Morse, *Addiction, Genetics, and Criminal Responsibility*, 69 LAW & CONTEMP. PROBS. 165 (Winter/Spring 2006).

7. Deborah W. Denno, *Revisiting the Legal Link Between Genetics and Crime*, 69 LAW & CONTEMP. PROBS. 209 (Winter/Spring 2006).

of DNA databanks and the potential use of such databanks for behavioral genetics research in his article, *Behavioral Genetics Research and Criminal DNA Databases*.[8] He addresses the concern that DNA databanks serve as a limitless repository for future research and that the samples used in the databanks could be used for research into a "crime gene." Kaye provides a compelling explanation of why, given the nature of the samples used in DNA databanks and the difficulties and limitations of behavioral genetics studies, the search for a "crime gene" is unlikely by scientists. Nonetheless, he agrees that the concerns about the limitless use of these samples cannot be so easily dismissed. He provides a thorough review of state and federal DNA databank legislation and explains that although such legislation likely prohibits "crime gene" investigations, greater protections for privacy are needed to ensure that future amendments do not override such protections. Finally, he addresses some of the bioethical and social arguments against "crime gene" research using samples stored in DNA repositories, particularly given the involuntary contribution of many such samples and the ethics of retaining these samples at all. He significantly advances the policy debate on this issue by proposing mechanisms for guarding against unauthorized use of DNA repositories.

Erica Beecher-Monas and Edgar Garcia-Rill then consider the unfortunate probability that behavioral genetics evidence will be misused to substantiate predictions of future dangerousness in their article, *Genetic Predictions of Future Dangerousness: Is There a Blueprint for Violence?*[9] They discuss the problems with using actuarial instruments to refine the accuracy of future dangerousness predictions, which are employed in contexts including death penalty proceedings, sex offender registrations, and post-sentence commitments. Beecher-Monas and Garcia-Rill explain in significant detail the scientific reality of behavioral genetics evidence, including a step-by-step account of the complex interaction between genes, proteins, nerve cells, biochemical and neurochemical pathways, and the environment, which combine to give rise to human behavior. Their detailed account affords a critical understanding of the amount and complexity of information necessary for behavioral genetics to offer any insight into predictions of future dangerousness. Their discussion makes apparent that in its present state, behavioral genetics research cannot improve predictions of future dangerousness, and only with significant further scientific progress might such information have relevance.

Finally, Karen Rothenberg and Alice Wang's article, *The Scarlet Gene: Behavioral Genetics, Criminal Law, and Racial and Ethnic Stigma*, is a powerful discussion of the broader social implications of researching traits of interest to

8. D.H. Kaye, *Behavioral Genetics Research and Criminal DNA Databases*, 69 LAW & CONTEMP. PROBS. 259 (Winter/Spring 2006).

9. Erica Beecher-Monas & Edgar Garcia-Rill, *Genetic Predictions of Future Dangerousness: Is There a Blueprint for Violence?*, 69 LAW & CONTEMP. PROBS. 301 (Winter/Spring 2006).

the criminal law.[10] The article is framed by the PBS television program *Genes on Trial: Genetics, Behavior, and the Law*, in which participants discussed the situation of the fictitious Tracy Islanders, an ethnic group with a higher incidence of alcoholism, attributable in part to the increased incidence of a particular gene variant in the population. The article considers the social impact for those who participate in behavioral genetics studies, particularly when such research focuses on behaviors related to conduct such as addiction. Rothenberg and Wang explain that such studies often focus on discrete and insular ethnic groups because of their relatively homogeneous gene pools. Such groups may suffer stigmatization if particular genetic variations are discovered that contribute to behavioral variations in that population. The article considers the potential for genetic reductionism and determinism, which would shift the focus away from other contributions to violence (including environmental and societal ones) and instead narrowly address the genetic contributions of behavioral differences. Rothenberg and Wang's article addresses whether certain types of research should be conducted at all, as well as the ethical and social concerns that arise from both the study of behavioral genetics as it relates to criminal behavior and the introduction of that information into criminal cases.

In sum, this symposium affords an in-depth background and analysis of critical issues arising from behavioral genetics research and its use in the criminal justice system. Although the use of behavioral genetics evidence in criminal cases has been relatively limited, one commentator recently noted:

> We stand, in all likelihood, at the threshold of an era in which we will see progressive growth in our knowledge of the genetic bases of behavior. Genes that alone or in combination with environmental influences put persons at high risk of violence and other crimes will be identified. Faced with that prospect, it would behoove us to think through now how we believe our criminal justice system should be responding to the inevitable dilemmas that will arise.[11]

Together, these articles represent an important effort to address the "inevitable dilemmas that will arise" from the introduction of behavioral genetics, and behavioral biology more generally, into the criminal law.

10. Karen Rothenberg & Alice Wang, *The Scarlet Gene: Behavioral Genetics, Criminal Law, and Racial and Ethnic Stigma*, 69 LAW & CONTEMP. PROBS. 345 (Winter/Spring 2006).

11. Paul S. Applebaum, *Behavioral Genetics and the Punishment of Crime*, 56 PSYCHIATRIC SERVICES 25, 27 (2005).