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various international treaties of which Nigeria is a signatory. When this is done, individuals may be able to hold the government accountable for any harm incurred as a result of its failure to provide adequate healthcare facilities for its people. Additionally, the National Health Act 2014 should be reviewed to incorporate the liability of healthcare providers for negligence. Presently, the Act does not indicate the nature of complaints that can be brought under it or the sanctions that such complaints might incur.

Conclusion

The aforementioned recommended reform efforts are proffered with the overall aim that Nigeria's healthcare system would be made more efficient. A combination of punitive measures and infrastructural improvement of our countries healthcare system will provide a holistic response to the prevalence of medical malpractice in Nigeria. Indeed, medical practitioners are not perfect, and the law does not require them to be infallible. It would be absurd and idealistic to impose on them such a herculean standard. Mistakes and some undesirable outcomes are bound to occur. Nonetheless, in order to limit draconian judicial and legislative oversight, the medical profession should endeavor to recognize and accommodate patients' expectations and demands in order for its social contract to function well for the quality of healthcare. It is the responsibility of health regulatory bodies to show more diligence in the delivery of their services and to continue to educate their members on their responsibilities in practice. The profession should not be cavalier and lenient in policing itself. Doctors and other healthcare providers must endeavor not to sacrifice ethics and care on the altar of financial gain. The era of greater accountability in medical practice and patient rights has come to stay. It is expected that our courts and legislators will adapt to this shift from protectionism. Medical practitioners and healthcare providers will do well to align their practice to suit this emerging trend.

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Justifying Genetics as a Possible Legal Defence to Criminal Responsibility in Nigeria

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Abstract

The saying that criminals are born rather than made seems to rekindle the anthropological debate on the relationship between nature and nurture (genes versus environment). This is the controversy as to whether every individual is the product of his genes or his environment or both. However, jurisprudence of many criminal cases tends to question whether a person's inherited genes predispose him to violence and further determine his criminal responsibility in law. Under the Nigerian criminal law, the legal test of criminal responsibility is mainly whether the accused person intends the consequence of his act or whether he truly knows if what he was doing is right or wrong. Over time, those who commit murder due to one psychotic or hereditary mental disorders end up with an insanity acquittal, therefore leaving genetics out of the question. This is primarily because genetics is not recognised as a legal defence in Nigeria. It is also a new terrain which has not been explored by the courts probably because the area is complex and strictly scientific. However, in some western societies, the

abnormal Monoamine Oxidase A (MAOA) gene and XYY chromosome have been held to be linked with crime. This paper tries to justify the inclusion of such abnormal genetic disturbance as a possible legal defence in the Nigerian criminal justice system. The methodology is doctrinal with primary and secondary sources which are based on extensive and explanatory study of Nigerian criminal laws, medical and psychology textbooks, scientific journals, judicial decisions, discussions with few doctors and online materials. These findings indicate that Nigeria may not yet be ready to explore genetics as a legal defence because insanity stands as a valid alternative defence. However, there is hope as the Criminal Law of Lagos State 2011 has indirectly associated with genetics through its provision on diminished responsibility.

Introduction

Many a root cause of crimes has been traced to sociological, environmental, or lifestyle factors such as drugs, poverty, bad government policies and problem homes.[1] Past and present researches have also established a nexus between human biology and crime,[2] which has made scientists identify genes as a big influence not only in human appearance and biochemistry but also in human behaviour. It is claimed that any violation of legal norms is an extension of a criminal behaviour. Hence, when people deviate from a normal behaviour, it is often perceived as insanity. The focus rarely identifies an underlying defective gene.

Generally, genes are sometimes said to be the fundamental determinant of who and what human beings are. This conviction holds sway in some western countries wherein genetic analysis has revealed the link between certain genes and violent behaviour. Thus, few killers have been convicted for manslaughter rather than murder after deoxyribonucleic acid (DNA) evidence proved the murderers had unusual high levels

[1] U Usman, M Yakubu and AZ Bello, 'An Investigation on the Rate of Crime in Sokoto State Using Principal Component Analysis' (2002) 20(2) NJBAS 152.

[2] See Paul Bloom, 'Natural Born Killers' *The New York Times* (New York, 21 June 2013) < https://www.nytimes.com/2013/06/23/books/review/the-anatomy-of-violence-by-adrian-raine.html > accessed 12 March 2015.

of the warrior gene.[3] Noteworthy is the fact that such criminals have been referred as "prisoners of biology". The presumption is that people with such abnormal genes are deemed to be hardwired to become criminals, on the basis that such genes may affect a person's ability to form a rational judgement about whether a particular act is right or wrong. According to the law, where a person's mind is so affected to a substantial degree, he is not expected to be treated as fully responsible for his acts and commissions because his responsibility has become diminished.[4]

There is no gainsaying that genetics plays a significant role in human behaviour including criminal. Some relevant questions are thereby elicited: Is human genetic constitution a chemical instruction that tells the body to act or react in a certain way? Does crime have a biological root or is there a genetic predisposition toward crime? Should Nigerian law give credence to genetics just as it is done to insanity or mental disorder? Responses to these posers constitute the main thrust of this study.

Definition of Key Concepts

Criminal Responsibility

The idea of criminal responsibility is based on human free will to make a choice to do or omit to do an act. Section 1 of the Nigerian Criminal Code defines criminal responsibility as liability to punishment for an offence.[5] This is sequel to a conviction by a court of competent jurisdiction. When courts use the term "responsibility", they are generally referring to responsibility in law. For instance, children under a certain age or persons who are legally regarded as insane are not responsible for their actions in criminal law. In as much as criminal responsibility varies in different jurisdictions and can be changed by statute,

[3] A Caspi and others, 'Role of Genotype in the Cycle of Violence in Maltreated Children' (2002) 297(5582) Science 851.

[4] *Galbraith v HM Advocate* 2001 SCCR 551.

[5] Criminal Code Act, Cap C38, Laws of the Federation of Nigeria 2004, cap 5; Criminal Law of Lagos State 2011.

responsibility is a legal and not a medical or psychological concept.[6] Therefore, in order to be relieved of criminal responsibility, the offender is required to provide a legal defence to show that he is not personally at fault.

Legal Defence

This is a defence which is complete or adequate in point of law or presented and acceptable in a court of law.[7] Defences are available to those who feel they are not at fault. For example, the insane or the mentally disordered,[8] the intoxicated,[9] immature ones,[10] judicial officers,[11] and those accused of accidental crimes[12] all enjoy legal defences under criminal law. The Criminal Law of Lagos State has gone further to exempt from murder, a woman who suffers depression as a result of childbirth – postpartum or puerperal psychosis[13] and a person who commits murder due to diminished responsibility.[14]

Genetics

Genetics is simply the scientific study of heredity and natural development. Generally, it is the way in which different characteristics are passed from each generation of living things to the next.[15] Inherited characteristics are carried from generation to generation by the chromosomes, which are the organized structures inside human bodies that carry genetic information. Normally, humans are born with 46 chromosomes, arranged in 23 pairs and they are composed of thousands of

[6] *Gailbraith* (n 4) /
[7] BA Garner (ed), *Blacks' Law Dictionary* (7th edn, 2000) 420.
[8] Criminal Code Act, s 28; Criminal Law of Lagos State 2011, s 27.
[9] Criminal Code Act, s 29; Criminal Law of Lagos State 2011, s 29.
[10] Criminal Code Act, s 30; Criminal Law of Lagos State 2011, s 30.
[11] Criminal Code Act, s 31; Criminal Law of Lagos State 2011, s 31.
[12] Criminal Code Act, s 24; Criminal Law of Lagos State 2011, s 24.
[13] Criminal Law of Lagos State 2011, s 28.
[14] Criminal Law of Lagos State 2011, s 226.
[15] *Oxford Advanced Learner's Dictionary* (8th edn, OUP 2015) 624.

genes which are the basic units of heredity. It can be concluded that the gene is the information area ... transmission of an inherited trait.[16]

Environment

The Environment in this context includes the family, ... and society as a whole, together with the complexity ... that interact to produce personality and social tende... influence individuals to act in a particular manner, whether ... or bad. Accordingly, the environment has a large im... higher up to the ancestral chain. For instance, the ... notorious Ward Weaver family in Oregon City in ... relevant here. When Francis Paul Weaver was still a ... grandfather Ward Weaver III, went to prison for murder... young couple in California. When Francis Paul Weaver ... 22, his father Ward Weaver Jr. equally went to pris... murdering two girls. When Francis Paul Weaver turned ... was personally charged with murder as well. It was rep... within the Ward Weaver family, violence and cruelty has ... exhibited trait throughout their four different generations. Though exhaustive DNA investigations later showed Francis Weaver is not Weaver Jr's biological son, but the fact that he was raised in that Ward Weaver environment discounted the nature theory and upheld the nurture argument. No wonder the common saying that the environment makes a man! The recent local example we have in Nigeria is that of the nanny Wo... Funmilayo Adeyemi who abducted three children on the ... April 2015 in Lagos State. After she was arrested by the ... she said kidnapping runs in her family because her entire ... members (husband, brother-in-law, sister-in-law, and ...

[16] MA Krupp and MJ Chatton, *Current Medical Diagnosis & Treatm...* Lange Medical Publication 1980).
[17] Rick Bella, 'Murder Suspects Francis Weaver, Son and Grand... Once Shot his Best Friend' *The Oregonian* (Oregon, 19 ... <https://www.oregonlive.com/oregon-city/2014/02/francis_weavers_father_grandfa.html> accessed 12 ...

law) have been consistently kidnapping children.[18] Definitely, her claim is spurious because adults have the ability to choose their environment and life to live which could either be negative or positive.

Monoamine Oxidase A (MAO-A) Gene

This gene was first detected as being a possible cause of antisocial disorder in 1993 by a team led by H.G. Bunnet.[19] Though the study did not cover the general population, the research conducted on a certain Dutch family showed that the low activity MAO-A gene leads to impulsivity and aggression. This aggressive behaviour includes mild mental retardation and an involuntary behaviour which has the tendency to produce attempted murder, arson, as well as sexual abuse. However, research has proven that MAO-A has variants of the high level and the low-activity version. Several individual versions of the gene are found in different individuals and differ in ethnic groups.

XYY Chromosome

This is an extra Y syndrome which has been linked to personality disorder chromosome and aggression. As earlier stated, chromosomes are the structures inside human bodies that carry genetic information. In order to make sense to a layman, we say babies are normally born with 46 chromosomes, 22 pairs are identical in boys and girls, the remaining pair consist of two X chromosomes in girls, and an X and a Y chromosome in boys.

[18] Channels Television, 'Alarming Confession of Nanny who Kidnapped Orekoya Children (16 April 2015) <https://www.youtube.com/watch?v=YfAcRfDsBH8> accessed 12 March 2015.

[19] HG Brunner and others, 'X-Linked Borderline Mental Retardation with Prominent Behavioural Disturbance; Phenotype, Genetic Localization, and Evidence for Disturbed Monoamine Metabolism' (1993) 52(6) American Journal of Human Genetics 1032 <https://www.ncbi.nlm.nih.gov/pubmed/8503438> accessed 12 March 2015.

But occasionally, a child is born with 47 chromosomes and if the extra chromosome is a Y chromosome, it means the child is a boy with XYY syndrome and the cause has been confirmed that it has nothing to do with parental age, health or ethnicity. It is not inherited either but only an accident at conception.[20] Despite that, the presumption and research still maintain that males with this extra Y chromosome are predisposed to be violent criminals.

Crime, *Mens Rea* and Behavioural Genetics

A fundamental principle of criminal law is that apart from the physical element, actus reus, a crime consists also of a mental element called the mens rea. This latter connotes a person's awareness of the fact that his or her conduct is criminal. One of the necessary elements of crime, mens rea, derived from Latin and literally means "the guilty mind". The standard of criminal liability is therefore usually expressed in the Latin phrase, *actus reus non facit reum nisi mens sit rea,* which means "the act is not culpable unless the mind is guilty". It is therefore the general rule that criminal liability cannot be attached to a person who merely acted with the absence of mental fault. Yet, some writers have argued that certain psychological behaviours are inheritable[21] and in certain circumstances, persons with those genes could find themselves engaging in criminal activity.[22] This is a veritable challenge to the requirement of mens rea for criminal liability.

The evidence concerning heredity was prevalent between 1870 and 1890 when writers such as Charles Darwin and the Italian physician Cesare Lombroso postulated genetic determinism. Their evolutionary approaches emphasized the importance of biological factors and their starting point was

[20] A Giles, 'The XYY Factor – How a Rare Chromosomes Disorder brought my Son a World of Pain' *Daily Mail* (London, 1 November 2008) <https://www.dailymail.co.uk/health/article-1082293/The-XYY-Factor-How-rare-chromosome-disorder-brought-son-world-pain.html> accessed 15 April 2015.

[21] See BA Pierce, *The Family Genetic Sourcebook* (John Wiley & Sons Inc 1990).

[22] Caitlin M Jones, 'Genetic and Environmental Influence on Criminal Behaviour' (2005) Rochester Institute of Technology <http://www.personalityresearch.org/papers/jones.html> accessed 12 March 2015.

Darwin's theory of evolution which believed that processes of natural selection shaped human behaviour and experience. According to evolutionary psychology, man's modern behaviours are shaped by the problems faced by his ancestors millions of years ago.[23] Cesare Lombroso also tried to discern a possible relationship between criminal psychopathology and physical defects. His emphasis was mainly that crime is hereditary and that there are born criminals who exhibit a higher percentage of physical and mental anomalies than non-criminals.[24] He maintained that crime was not a characteristic trait of human nature but rather that criminality is inherited, meaning someone born a criminal could be identified by physical (congenital) defects, which confirmed a criminal as savage or atavistic. In fact, his theory of crime was completely a biological theory.[25]

The consequence was that in the late 19th and 20th centuries, inhumane treatment was melted offenders because of a widespread belief that genes were the sole reason of criminal behaviour. Criminals were then sterilized to rid society of breeding criminals and idiots. The era was likened to the study of epigenetics, a pseudo-science that holds that mankind is improved by breeding out the bad. In Nigeria, it has been said that the mentality of the Boko Haram insurgents is geared towards deliberately raping women with the intention of getting them pregnant so that the women would give birth to future insurgents as successors of their violent struggle. The sect members believe children fathered by them are likely to inherit their ideology later in life.[26]

[23] Mike Cardwell, Liz Clark, Claire Meldrum, *Psychology AS for AQA A* (4th edn, Harper Collins 2008).

[24] Charles A Ellwood, 'Lombroso's Theory of Crime' (1912) 2(15) Journal of Criminal Law and Criminology 716 <https://scholarlycommons.law.northwestern.edu/cgi/viewcontent.cgi?article=1128&context=jclc> accessed 15 March 2015.

[25] Jones (n 22).

[26] See Ndahi Marama, 'Boko Haram Rape "Kidnapped Girls" to give Birth to Future Fighters – Shettima' *Vanguard* (Maiduguri, 4 May 2015) <https://www.vanguardngr.com/2015/05/boko-haram-members-rape-kidnapped-girls-to-continue-lineage-of-terrorists-shettima/> accessed 15 June 2015.

Article 2(v) of the United Nations International Declaration on Human Genetic Data 2003 provides that behavioural genetic study establishes possible connections between genetic characteristics and behaviour. Therefore, it is apt to say that behavioural genetics is a research which associates a gene with a deviant behaviour and sees the need to seek genetic analysis for the reasons behind violent crimes. This explains why the gene for criminality is being canvassed as a defence.

It may be necessary to identify some more relevant concepts. These are genetic reductionism and genetic determinism. Genetic reductionism occurs when all traits and behaviour are attributable to genes while no attention is being paid to other potential factors such as freewill, choice and environment. Just as genetic reductionism, genetic determinism is the impulse to treat DNA as destiny, as in when an individual believes his future is defined and predicted by genetic make-up that cannot be changed. These concepts suggest that one cannot deviate from one's genetic predisposition and the influence of genes on human behaviour[27] rather than environmental factors. In other words, both concepts believe the offender lacked the intention (*mens rea*) to commit the offence, which then does not deserve the full extent of punishment because the faulty genes rendered the offender not culpable for the crime. Two major disadvantages of behavioral genetics are that it has the potential to shift the blame away from the offender and further stigmatize or stereotype racial and ethnic groups.

In *State v Madey*[28] the court asked the defendant's mother whether she knew anything about genetic predisposition to alcoholism and whether she was concerned that her daughter would become an alcoholic because of the wide perception that American Indians are genetically predisposed to alcoholism. This case shows that traits based on heredity can stigmatize an ethnic group and erroneously paint that particular group as potentially guilty of specific crimes. This may also affect the racial profiling

[27] Karen Rothenberg and Alice Wang, 'The Scarlet Gene: Behavioral Genetics, Criminal Law, Racial and Ethnic Stigma' (2006) 69(1) Law & Contemporary Problems 343.

[28] 2002-Ohio-5976

techniques used by the law enforcement agencies and can lead to bias and injustice.[29]

In *Caldwell v State of Georgia*,[30] Huntington disease[31] was raised as insanity defence by the defendant who had shot her children. After the psychiatrists and her daughter testified that the defendant was sane when she committed the offence, the defendant was sentenced to life imprisonment. While in prison defendant showed signs of Huntington disease and the presence of the gene was confirmed. During retrial, she was found to have been symptomatic at the time of the murder and on this basis, she was freed. The Huntington' Disease Society of America worried that the defence would stigmatize all Huntington's sufferers as violent and lead to discrimination, especially in the area of employment.

It should be noted that behavioural genetics has had its fair share of drawbacks. For instance, it suffered a setback in 1992, when the proposed "Genetic Factors in Crime" Conference Agenda, initiated by the Institute of Philosophy & Public Policy, University of Maryland in U.S wanted to bring together Historians, Scientists, Sociologists, Philosophers, Criminal Justice Experts and Legal Scholars to discuss the role of genetic research and technology in predicting, explaining and controlling criminal behaviour. At the end of the day, the conference could not hold because it received attacks from the Black Community and mental health authorities; consequently, the US government had to stop the conference.[32] This is understandable because the

[29] See Boniface E Ewulum and Ikenga KE Oraegbunam, 'Ethnic Profiling in Terrorist Investigation in Nigeria: A Violation of the Fundamental Right of Freedom from Discrimination' (2015) 3(2) IJPLR 20.

[30] 354 S.E 2d 124 (Ga.1987)

[31] See Zachary L Stewart, 'The Legal Implications of Behavior Genetics Research' (2013) 13(1) William College Law Journal; Andrew Lockie, *The Family Guide to Homeopathy* (Prentice Hall Press 1991).

[32] Philp J Hilts, 'U.S. Puts a Halt to Talks Tying Genes to Crime' *The New York Times* (New York, 5 September 1992) <https://www.nytimes.com/1992/09/05/us/us-puts-a-halt-to-talks-tying-genes-to-crime.html> accessed 12 June 2015.

MAO-A research was seen to be discriminatory against African-Americans or those closely associated with African ancestry.[33]

Despite the 1992 setback, behavioural genetics got a wider attention in December 2012, when a 20-year-old Adam Lanza walked into an elementary school in Connecticut U.S, took out his shotgun and killed 20 children, 6 adults and his mother. He also shot himself. This incident made the genetics department in the University of Connecticut to embark on analyzing Lanza's DNA with the aim of finding out whether there is a gene that makes some people evil so that future murderers could be spotted before they commit crimes. The outcome of the research is still being awaited till date.[34] Suffice it to say that this is not the first time of conducting such genetic research. The year 1931 was the first attempt when the German serial killer, Peter Kurten (The Vampire of Dusseldorf)[35] was charged with 9 murders and 7 attempted murders. The killer admitted to have committed his first murder at the age of 9 and claimed to have drunk the blood of at least one of his victims. After his trial, he was executed and his brain was removed from his corpse for examination, but no useful conclusions have been published about his gene.

Fortunately, behavioural genetics is still getting support by the day. In 2014, genetic analysis of 900 offenders in Finland revealed the MAO-A and CDH13 as the two major genes that are associated with violent crime. Those with the genes were discovered to be 13 times more likely to have a history of repeated violent behaviour.[36] In the United Kingdom, the largest survey of its kind ever conducted was recently published and its main research was the discovery of a strong genetic component to sexual offences. The Study was based on a survey of 21, 566

[33] Dr Phil, 'Scientists Rediscover the Violence Gene, MAOA-2R' (*The Unsilenced Science*, 30 December 2012) <http://theunsilencedscience.blogspot.com/2012/12/scientists-rediscover-violence-gene.html> accessed 23 April 2015.

[34] Julia Llewellyn Smith, 'Studying Adam Lanza: Is Evil in our Genes' *The Telegraph* (London, 10 April 2013) <https://www.telegraph.co.uk/news/science/science-news/9968753/Studying-Adam-Lanza-is-evil-in-our-genes.html> accessed 20 April 2015.

[35] ibid.

[36] Melisa Hogenboom, 'Two genes linked with violent crime' (*BBC* 28 October 2014) <www.bbc.com/news/science-environment-29760212> accessed 10 April 2015.

men convicted of rape and other sexual crimes in Sweden between 1973 and 2009 but experts said it was almost certainly applied to offenders in the UK too. Scientists however warned that these findings should not be used as an excuse to restrict the freedoms of the male relatives of sex offenders. In the words of Seena Ford, a Professor of Psychiatry, Oxford University:

> We are definitely not saying that we have found a gene for sexual offending or anything of the kind...neither are we suggesting that there are genes for rape or paedophile. What we have found is high quality evidence from a large population study that genetic factors have a substantial influence on an increased risk of being convicted of sexual offences.[37]

An off-shoot of behavioural genetics is the research that has been conducted on twin, adoption and family studies[38] which critically analyses the distinction between genes and the environment and examines whether genetics is a strong component to criminal behaviour. However, researchers also agree that there is an environmental component which is also a determining factor. This is popularly referred to as the gene-environment interactions theory.[39] The considerable data from these studies seem clear and that is: environmental factors contribute significantly to the development of criminal behaviour but the genes cannot be undermined either.[40]

In Nigeria, the closest research we have on behavioural genetics is the criminal behaviour of inmates' assessment conducted on interactive effects on personality traits, sex and age of inmates in few Nigerian prisons.[41] This research however did not touch on the XYY and MAO-A genes.

[37] Steve Connor, 'Men up to Five Times More Likely to Commit Sex Crimes than the Average Male if they have Brother or Father Convicted of a Sex Offence' *The Independent* (London, 9 April 2015).

[38] See Jones (n 22).

[39] Maureen P Coffey, 'The Genetic Defense: Excuse or Explanation?' (1993) 35(1) WMLR 353.

[40] ibid.

[41] Dele J Tenibiaje, 'Literacy, Information and Communication Technology as Tools for Empowerment of Inmates' (2012) 1(2) European Journal of Educational Research 117.

It should be emphasised that the field of behavioural genetics is broadly interdisciplinary; it incorporates findings from genetics, biology, psychology, sociology and statistics, as well as some other disciplines. They have all realized that behavioural genetics includes the study of a person's family history as well as direct testing of the person's physiological makeup by way of brain scans. Their general view however is that while genes influence behaviour, they do not govern or determine it totally,[42] though the courts have granted concessions in certain cases.[43] Overall is that when behavioural genetics evidence is pleaded in court, the aim is for the convict to get a lesser or lighter sentence but not an acquittal.

The XYY Chromosome, MAO-A Gene and Criminal Liability in Some Jurisdictions

Just as criminal law defines certain acts of crime in every jurisdiction, it also exempts certain conducts from criminal liability. Where there is disability in a person's freedom to choose right over wrong or if a person commits a crime by a factor outside his control, then his act will not impute criminal responsibility. This is in consonance with various legal systems' acceptance of the defences of insanity or mental disorder and others.[44]

Several genes have been associated with aggression and criminal conducts that exempt criminal liability. They include Serotonin, CDH13, DRD4 and ADHD.[45] However, two major defective genes (XYY and MAO-A) have been specifically linked with violence especially in few foreign jurisdictions, such as in United States of America, Italy, France and Finland. The belief in these countries is that in light of the increasing understanding

[42] DH Fishbein, 'Biological Perspectives in Criminology' (1990) 28 Criminology 1990.

[43] *State v Waldroup* 654 N.E.2d 390

[44] See (n 8); (n 9); (n 10); (n 11); (n 12); (n 13); (n 14).

[45] Dolores Garcia-Arocena, 'The Genetics of Violent Behaviour' *(The Jackson Laboratory)* <https://www.jax.org/news-and-insights/jax-blog/2015/december/the-genetics-of-violent-behavior> accessed 23 March 2015.

and advancement in knowledge, the traditional notions of responsibility should be modified to square with a scientific view of human conduct which should recognize that certain individuals are different from the 'normal' person who may not possess the same degree of free will applicable to all.[46] We examine the two popular genes as follows:

The XYY Chromosome Syndrome

A normal female has two X chromosomes whereas a normal male has one X and one Y. Concerns are raised when a male is discovered to have a duplicate Y chromosome as this becomes chromosomal abnormality. This chromosomal abnormality is called "the supermale syndrome"; individuals who have it are said to be of above average height and below average intelligence; just as the weight of scientific knowledge portrays it as the gene of criminality and aggression.[47] This XYY chromosome as a defence actually created a loophole because most criminal defendants started blaming their crimes on their extra Y chromosomes. Meanwhile, the law abiding XYY males were not only stigmatized as congenital criminals, hospitals also began screening newborn for XYY for selective abortion.

Generally, the courts have been very careful with their approach to the XYY anomaly defence. In *People v Tanner*,[48] the defendant pleaded not guilty by reason of insanity and sought to introduce evidence discovered during his hospitalization that his cells possessed an extra Y chromosome. The court held that the concept of a "genetic criminal" had not been legally recognized in the United States and that there was lack of adequate proof even though a testimony was given by expert geneticists who could not convince the court that the defendant's aggressive behaviour actually resulted from chromosomal abnormality.

[46] Coffey (n 39).
[47] See Alan Bainbridge and others (ed), *OCR A2 Psychology Student Book* (Heinemann 2008).
[48] 23 Cal. 3d 16

In *Millard v Maryland*[49] the defendant was charged for robbery. He claimed that he was insane at the time of the commission of the crime due to his chromosomal abnormality. The court was not convinced because the evidence of the geneticist did not clearly establish that the defendant suffered from genetic abnormality. As a result, the XYY defence was rejected under the substantial capacity test for insanity and further because the expert testimony only tended to show in a "general way" that the abnormality caused the defendant to be antisocial and aggressive. Also, in *State v Roberts*,[50] the court held that it has the discretion to hold that in the absence of sound medical support of the XYY defence, the behavioural impact of this chromosome defect has not been precisely determined. In *People v Yukl*,[51] the court held that genetic imbalance theory crime causation has not yet been sufficiently accepted to warrant admitting evidence of a biological affliction, but that a more definite proof and future research efforts might lead to a more successive claim.

In the Australian case of *Regina v Hannell*,[52] the XYY syndrome of the defendant who stabbed his elderly landlady was supported by a psychiatrist. In spite of the expert evidence, the court held that the XYY gene did not have an impact because the defendant was proved to be legally insane at the time. However, in the French case of *Daniel Hugon*,[53] the defendant was charged for murder after killing an elderly prostitute. He was eventually given a reduced sentence based on his XYY syndrome.

The Monoamine Oxidase A (MAO-A)

This is a neuro-chemical in the brain that is associated with aggressive criminal behaviour among a number of males in the family. It is a gene which the media has consistently termed a warrior gene, rage gene, bad-behaviour gene, or a murder gene,

[49] 261 A.2d 227
[50] 544 P.2d 754
[51] 372 N.Y.S.2d 313
[52] 2 AUST & NZJ Crim.29 (1968)
[53] Stewart (n 31).

all in a bid to describe genetic phenomena presumably because having this gene would make an individual an optimal warrior. Scientifically, the MAO-A is a genetic sequence in certain individuals that apparently predisposes them to reacting both violently and disproportionately, including going berserk with a dangerous weapon.[54] In *Mobley v State*,[55] the defendant was convicted and sentenced to death for murder, armed robbery, aggravated assault and possession of a firearm. In the course of analysing defendant's family during trial, four generations including his uncles, aunts, and his grandfather were discovered to be violent and responsible for past criminal acts. The defendant's attorneys even requested the court, that the defendant's genes be allowed to be tested but this was denied by the trial judge who held that genetic research was not yet strong enough to show a causal link between crime and genetics. The defendant appealed against his conviction and the Supreme Court held that:

1. The defendant was not entitled to funds for expert witnesses to conduct preliminary testing to determine whether defendant suffered from a deficiency of enzymatic activity for (MAO-A) genetic testing and so it cannot be used as evidence to mitigate his sentence because it has not suggested a possible genetic basis for violent behaviour either.
2. That the evidence at the trial court was sufficient to support defendant's convictions, irrespective of his genetic and violent disordered background.

In *State v Waldroup*,[56] the appellant, after shooting his wife's friend eight times and slicing her head open with a sharp object, chased after his wife with a machete, chopped off her finger and cut her over and over. A forensic psychiatrist testified that the

[54] Lloyd Duhaime, 'Killer by Design?' (*LawMAG*, 22 July 2013) <www.duhaime.org/LawMag/LawArticle-1578/Killer-By-Design.aspx> accessed 23 March 2015.

[55] 455 S.E. 2d 61 (1995)

[56] *State v Waldroup* 654 N.E.2d 390 (1995)

appellant carried the violent MAO-A gene. The court accepted his genetic defence and he was finally convicted of manslaughter and sentenced to 32 years imprisonment instead of serving a death sentence for murder.[57]

The courts in Italy have also been giving lighter sentences to murderers with the MAO-A genes:[58] In 2007, Abdelmalek Bayout, an Algerian citizen in Italy admitted to stabbing and killing the deceased who had insulted him over the eye make-up he was wearing. The Italian appellate court made the news by reducing the sentence based on the brain scan evidence which portrayed the "low activity" version of defendant's MAO-A gene. In 2009, Stefanus Albertani pleaded guilty to murdering her sister and attempted murder of her parents. Two psychiatric reports reached opposite conclusions. The defence then brought in a new team that added neuro-imaging and genetic analysis which found that she had the low activity version of MAO-A as a proof of partial mental illness. The court reduced her sentence of life imprisonment to 20 years.

Based on these cases cited above, it can safely be said that while the XYY syndrome has not really been allowed as an incapacitating gene in the United States due to insufficient proof, other countries like Italy and France have recognized the genetic defence. Perhaps, it could be because the conditions of the XYY boys improve or disappear with age and they grow out of their aggressive behaviour, so that even if they commit crimes, the best bet is to hospitalise them.[59] For the MAO-A, the judicial cases show that the law is not willing to punish people for crimes they have no control over and when this defence is presented in court, it serves only as a mitigating factor and consequently leads to a reduction from a death sentence to a jail term or life imprisonment.

[57] Criminal Code Act, ss 306 & 315; See also Criminal Law of Lagos State 2011, ss 221 & 227.

[58] Henry T Greely, 'Another "Brain Mitigation" Criminal Sentence from Italy' (*SLS*, 3 September 2011) <https://law.stanford.edu/2011/09/03/another-brain-mitigation-criminal-sentence-from-italy/> accessed 23 March 2015.

[59] Giles (n 20)

It should be noted that the courts do not make the trial an unserious affair. The affected individual usually undergoes series of tests such as in-depth clinical consultations, neuropsychological tests, genetic molecular tests, psychiatric tests, therapies, genetic and forensic analysis. After these tests are concluded, the courts invite experts to testify, and thereafter the findings are screened and verified. This helps the courts in their process of taking judicial decisions.

Genetics as a Possible Legal Defence in Nigeria

Responsibility is the essence of criminal law. That is why at the foundation of every criminal liability lies the principle of individual autonomy, which means that each human being should be treated as responsible for his own behaviour.[60] Therefore, for a suspect to be criminally responsible for his act or omission, he must have a mental knowledge of his actions. That is, the intent (mens rea) must correspond with the physical act (actus reus).[61] At the same time, every person is presumed to be sane until the contrary is proved[62] and so the law deems it unfair to blame a person for action if he could not control it or if he lacked substantial capacity which affected his responsibility. In *HM Advocate v Ritchie*,[63] Lord Murray attempted a brief catalogue of conditions that affect a person's responsibility:

> The abnormal condition may be permanent or passing. It may be induced by various causes. It may be congenital; it may be induced by illness, fever, palsy, accident, injury or shock; all these may induce a condition in which, in popular language, a man is not fully responsible for his action.

Presently, the defence of genetics is not known to Nigerian law; and so, it is not a valid and absolute legal defence. It follows that if a defence is not known under any written law, then it

[60] A Ashworth, *Principle of Criminal Law* (OUP 1991).
[61] See Criminal Law of Lagos State 2011, ss 24(2).
[62] Criminal Code Act, s 27; CLL Criminal Law of Lagos State 2011, s 26
[63] (1926) JC 45, 49.

cannot be pleaded in court.[64] However, what is intended in this paper is to justify whether those who possess the XYY chromosome or MAO-A genes, including other genetic disorders (known to appropriate sciences) in Nigeria are predisposed to violence and ultimately impaired from normal behaviour to commit crimes.

In Nigerian criminal law, the popular defence available to persons afflicted with mental disease which puts them in a condition that totally deprives them of effective control of their actions is the defence of insanity. This is provided for in Section 28 of the Criminal Code as follows:

> A person is not criminally responsible for an act or omission if at the time of doing the act or making the omission, he is in such a state of mental disease or natural mental infirmity as to deprive him of the capacity to understand what he is doing, or of capacity to control his actions, or of capacity to know that he ought not to do the act or make the omission.

It should be noted that this provision originated from the *M'naughten* Rules[65] governing insanity worldwide. The rules state that:

> in order to acquit an insane person, it must be clearly proved that at the time the act occurred, the accused person was laboring under such a defect of reason caused by a disease of the mind that he did not know the nature and quality of the act he committed or even if he knows, he did not know it was wrong.

Definitely, it makes sense to differentiate insanity from a genetic disorder. Insanity is synonymous with mental illness or psychosis which excuses a person from criminal responsibility and that is why such person is kept in an asylum after acquittal,[66] while a person with abnormal genes of violence or aggression cannot be

[64] Constitution of the Federal Republic of Nigeria 1999 (CFRN 1999), s 36(12).
[65] (1843) 8 ER 718 (HL).
[66] See AO Ajayi, 'Assessing the Defence of Insanity in Relation with the Concepts of Psychiatry and Asylum in Nigeria' [2015] 31 The Advocate 93.

said to be totally mad though he could exhibit mental traits in some instances which predispose him to commit murder. The reasoning behind proposing a genetic defence is that a person does not have an option to choose a good and a bad gene; it is inborn. It is beyond him if his supposedly bad gene renders him incapable of controlling his violent behaviour up to a point that his consciousness becomes significantly reduced.

Reasons abound for the justification of genetic defence. Some criminals including killers, no matter the country, ethnicity, race, socio-economic, education and background are all human beings who might have been born with the XYY and the MAO-A if only effort is taken by the authorities to run proper genetic tests on male prisoners nationwide. Just as western societies, where there are serial killers and spree killers, the atrocities of criminals in Nigeria ranging from wife-beaters, murderers to ritual killers and the overly-aggressive terrorists, suicide bombers and insurgents should not be waived aside. It is possible that these people may harbour the MAO-A genes or the XYY if they are subject to genetic investigation. After all, these genes usually manifest in violence and are prone to re-occur. In *Bratty v Attorney-General Northern Ireland*,[67] Lord Denning was of the view that:

> any mental disease which is prone to violence and likely to reoccur should suffice. At any rate, it is the sort of disease for which a person should be detained in hospital rather than give an unqualified acquittal.

Moreover, extensive research on behavioural genetics links XYY and MAO-A to aggression which has the tendency to affect the frame of mind of the offender at the time of his violent act. It is not then out of place to create a different section under the criminal responsibility provision in various Nigerian criminal laws to cater for the offender who commits a crime due to a fault in his biology, so far as it can be proved that the offender cannot comprehend the nature and quality of his wrongful act. This will

[67] (1961) 3 All ER 523.

also help our judicial authorities to recommend the appropriate therapy or maybe a workable punishment specifically meant for those affected with genetic disorders, instead of generalizing abnormality as insanity. However, there is hope in the Nigerian case of *George v State*[68] where the Supreme Court held that an epileptic may escape criminal liability if he commits an offence during a seizure and that he may receive a different consideration as against a person who had no fits just before, during or after the offence was committed by him.

Again, a look at the provisions of the first line of Section 24 of the Criminal Code may be helpful. It provides that: '...a person is not criminally responsible for an act or omission which occurs independently of the exercise of his will...' take also a look at the defence of diminished responsibility provided in Section 226(1) and (2) of the Criminal Law of Lagos State. The Section provides that:

> 1. Where a person kills or is a party to the killing of another, he shall not be convicted of murder if he was suffering from such abnormality of the mind, whether arising from a condition of arrested or retarded development of mind *or any inherent causes* or induced by disease or injury such as have substantially impaired his mental responsibility for his actions or omissions in doing or being a party to the killing.
> 2. A person who kills another under the provisions of subsection (1) of the Section is liable to be convicted for manslaughter.

A merger of these two sections in the criminal code and criminal code laws of various states can accommodate genetics and these can be made a broad concept since the elements of these provisions do not describe insanity. With the advancement in medical science, why should genetics not stand a better chance? Consider the case of *HM Advocate v Galbraith*[69] where the appellant killed her husband and during the trial, the appellant admitted that she had shot her deceased husband with a rifle

[68] (1993) 6 NWLR (Pt. 297) 41.
[69] *Galbraith* (n 4)

which he kept at home. Her contention was that her responsibilities for her actions had been diminished at the time she killed him. In support of the appellant's plea, the defence led the evidence of two psychologists who testified that the appellant was suffering from a form of Post-Traumatic Stress Disorder (PTSD). The only medical evidence led to support the plea of diminished responsibility came from one Dr. Thomas White, who testified that towards a certain time, the appellant had been suffering from clinical depression. The trial judge held and defined the elements of diminished responsibility as follows:

> (a) an aberration or weakness of mind;
> (b) some form of mental unsoundness of mind, *but not bordering on insanity;*
> (c) there must be a mind so affected that responsibility is diminished from full responsibility to partial responsibility, that is, some form of mental disease, though the person must be partially accountable for his actions.

Under diminished responsibility, the trial judge in the above case went further to say that:

> Head injuries and brain tumours may affect the patient's consciousness and lead to personality changes of various kinds. Strokes may result in patients becoming more aggressive. Disorders of the thyroid are known to have mental manifestations, while hypoglycaemia is well known to affect a person's behaviour sometimes making them disinhibited and aggressive. The mental abnormalities caused in these different ways could well impair a person to control his actions, but the *abnormality must be one recognized by appropriate science.*

Unveiling this relationship between the general Criminal Code applicable in the country with the Criminal Law of Lagos State can help guide our policy makers and the Law Reform Commission to have a proactive rethink.

More still, genetic defence is justified on the basis that Nigeria has qualified experts who can also discern abnormal genes when called by the court to do so. For proof of insanity,

the onus is always on the accused person's defence team to prove that he was insane.[70] But with a genetic defence, it will be justifiable for the court to invite qualified experts.[71] Section 68(1) of the Evidence Act[72] provides that 'when the court has to form an opinion upon a point of science ... the opinions of a person specially skilled in science are admissible'. When an expert is qualified, his viewpoint is valid.[73] In *HM Advocate v Galbraith*, the court queried the medical qualification of the two psychologists who came to testify that the appellant had PTSD because that was an area for the psychiatrists. It is clear that genetics is a specialized field, and so it may not be wise for the courts to dispense with medical evidence as they do in some cases. Consider the importance of experts in *Seismograph Services (Nig) Ltd v Ogbeni*[74] where the plaintiff sued for nuisance and damage to his house from defendant's exploration exercise. The plaintiff called for an expert to testify that the damage was caused by the vibration from seismic operation. The trial judge rejected it, saying the court was capable of making the relevant inference without resort to experts. On appeal, the Supreme Court held that the evidence of an expert was absolutely necessary to prove damage alleged to be caused by the vibration radiating from seismic operations because these are phenomena beyond the knowledge of the unscientific and untrained in seismology and civil engineering. This shows that medical evidence will be crucial in determining genetics but it is for law to lay down the appropriate test.

Furthermore, another justified reason is that molecular diagnostic techniques have found application in virtually all areas of medicine, including criminal investigations and forensic analysis. The techniques have become so precise that it is now possible to conclusively determine paternity using DNA from

[70] Evidence Act of 2011, s 139 (3)(c).
[71] Evidence Act of 2011, s 68(2).
[72] Evidence Act of 2011, s 68(1); *Onyekwe v State* (1988) 1 NWLR (Pt 72) 565.
[73] See *Arum v State* (1979) 11 SC 91.
[74] (1976) NSCC 130.

immediate and extended family members.[75] DNA analysis is used to establish or disprove some complicated trials in court, and so why not extend it further to inherent genes? After all, international best practice and legal precedents could guide Nigerian courts in giving it a trial. Perhaps, Nigeria should play an active role in the Human Genome Project[76] which can help provide a decisive evidence of genetic abnormality. New techniques in molecular biology have also enabled scientists to identify specific inherited defects in DNA- the genetic blueprint.[77] Finally, an encouraging justification can be inferred from the case of *Attah v State*[78] where it was held that in all criminal trials, all defences raised by an accused person no matter how weak or stupid or fanciful, or figment of imagination they may appear, must be considered by the court. We submit that the court should therefore accommodate this new defence of genetics and not to be too hasty to treat it as an equivalent of insanity.

Possible Limitations

Having considered the justification for the defence of genetics, legal or scientific minds should not be closed to the challenges. These challenges can come in any of these ways. The first borders on scientific evidence. How should judges determine whether the theories given by medical experts are truly grounded in science? Will the question of genetics not become substantially one of science? Should courts be allowed to present their conclusions or judgement in science?[79] It should not be forgotten that experts have claimed that there is no single gene that is

[75] AM Onoja, 'Paternity Testing' (2011) 20 Nigerian Journal of Medicine 406.

[76] 'An Overview of the Human Genome Project (*National Human Genome Research Institute*) <www.genome.gov/12011238f> accessed 23 March 2015.

[77] Steve Connor, 'Do your Genes make you a Criminal' *The Independent* (London, 12 February 1995) <https://www.independent.co.uk/news/uk/do-your-genes-make-you-a-criminal-1572714.html> accessed 23 April 2015.

[78] (2010) 10 NWLR (Pt 1201) 190.

[79] See *Hari Singh Gond v State of MP* (2008) 16 SCC 109.

responsible for criminal behaviour and that the MAO-A is an extremely rare condition which cannot be generalized.[80]

There is also an issue of difficulty or skepticism of proof. How do we prove the causal nexus between criminal behaviour and the genes? How can a genetic disorder be clearly distinguished from insanity since the essence of the two defences is to show a defect of reason which leads to failure of reasoning powers? Obviously, the accused must prove that his defective gene is of sufficient severity that resulted into homicidal tendency. Is it not likely that an offender with an abnormal gene may be aware of the nature of his act and also that performing such act was wrong? Again, since behavioural traits are not as accurately defined as diseases, they could be subjective and be manipulated. How then will the court identify a specific chromosomal sequence responsible for a criminal behaviour?[81]

Another is the question of polygenic nature of genetic disorder. This means a person's genes may be mixed up with other biological and environmental factors.[82] It is also possible for the genes to undergo a mutation thereby transmitting a new or altered trait. This change will also be transmitted to future generations.[83] Obviously, it is no news that some scientists have started altering genes, with the conviction that it will reduce the genetic predisposition to crime. For instance, several geneticists in some western countries have started modifying the DNA of human embryos, in order to make changes to people's personalities such as improving intelligence or physique with unpredictable results that would persist across generations.[84]

It should also be noted that genetic determinism is a blame-shifting mechanism which negates free will.[85] The society stands

[80] Rothenberg and Wang (n 27).

[81] Coffey (n 39).

[82] See DH Fishbein and RW Thatcher, 'New Diagnostic Methods in Criminology: Assessing Organic Sources of Behavioral Disorders' (1986) 23(3) Journal of Research in Crime and Delinquency 240.

[83] Krupp and Chatton (n 16).

[84] See Tom Whipple, 'Human Embryos Genetically Altered for the First Time' *The Times* (London, 14 March 2015) 5.

[85] Rothenberg and Wang (n 27).

the risk of danger if it could be proved in court that the criminal urge is traced to genes and that crime could no longer be blamed on societal problems as bad choices, drug addiction, unemployment, bad parenting etc. For instance, there is a dangerous development in the west, where there is a growing tendency to medicalise every behavioural problems while environmental factors are often sidelined. Moreover, genetic defence will have a bearing on labeling which may lead to stigmatization or discrimination and this affects the individual, family, community and society when genetic research focuses on criminal behaviour directed towards racial or certain ethnic groups. In fact, Dinesh Bhugra was reported to have said: 'inevitably if you give people a label, they behave according to the label'.[86] Finally, the typical Nigerian technical limitation such as lack of data and statistics to back up the genetic defence, lack of modern-day equipment and facilities in the laboratories and government hospitals, lack of funding to do research, lack of government's aid to science, are all glaring challenges.

Conclusion and Recommendations

While the debate and research supporting biological criminality over environmental factors continue and the relationship between genetics and criminal responsibility rapidly gaining attention in other legal systems, Nigerian law does not recognize the XYY and MAO-A genes as predisposing trigger to commit a violent crime. The cases we have cited here exist outside Nigerian shores. Consequently, this cannot form the basis of exculpation from criminal responsibility unless there is a law backing genetic defence. However, a combination of the first part of the provision of Section 24 of the Criminal Code and Section 226(1) of the Criminal Law of Lagos State holds out an encouraging prospect for genetics in the near future.

Apart from canvassing for genetics as a likely indicator for crimes in Nigeria, it is true that environmental factors also play a

[86] Libby Purves, 'Psychiatric Labels can Damage your Health' *The Times* (London, 2 March 2015).

fundamental role as our genes do not make us robots to act or react in a certain way. Probably, Nigerian judges and policy makers cannot fathom why genetics should now play a major role in the outcome of a criminal behaviour or why there should be excuses for deviant behaviour especially if some forms of violent behaviour are amenable to environmental interventions, drugs and other help therapies. On the whole, it should be noted that the court fixes the boundaries of a legal doctrine[87] as it would not want the legal system to be undermined or thrown into chaos by offenders who may want to test the court with outrageous claims of a defective gene. It then becomes a matter of legal policy for the court and the legislature to work out the legal framework and not for the scientists to do. Hope lies in making a presentation to the legislature in the very near future, as it is imperative that Nigerian judiciary and law-making body consider this genetic defence.

It is obvious that a genetic defence will have a significant impact in Nigerian criminal justice system in the near future. The following recommendations may go a long way. It is generally acclaimed that most perpetrators of crimes are males, flowing from the fact that men are more physically violent than women. It then lies on the Nigerian government to conduct a behavioural assessment research or a DNA mass screening exercise for convicted male prisoners in the country. Such results from the screening can be used to identify families that are most at risk and likely reduce violence because few of the offenders presumed to be insane or hardened criminals may actually have the XYY and MAO-A genes.

There should be more awareness about genetics, its advantages and how it influences life.[88] The education and training should start from secondary school level and not be restricted to science students alone. Scientists should also get the

[87] See *People v Tanner* 3 Cal.2d 279, 23 Cal. 3d 16; See also *Robinson v California*, 370 US. 660, 667 (1962).

[88] Joy Irobi-Devolder, 'Invest in Genetic Testing, Expert Tells Stakeholders' *Nigerian Observer* (Lagos, 13 February 2014) <https://issuu.com/nigerian_observer/docs/nigerian_observer_13-02-2014> accessed 10 April 2015.

media involved. In Britain, there is a television drama titled "The Code of a Killer". This drama depicts the work of the geneticist and the inventor of DNA profiling, Dr. Alec Jeffreys and a Detective Superintendent of Police who both explored the birth of a scientific technique that revolutionized police work to solve murder cases.[89] In the United States, there used to be a television program entitled "Genes on Trial: Genetics, Behaviour and the Law" and the focus was on the implication of behavioural genetic research on the society and exploration of the possibility of a DNA defence.[90] It therefore makes sense to say a good scientific investigation can make us understand what causes someone to be extremely violent and ultimately. This shows that Bioscience can be crucial to criminal investigation and criminal justice system.

Science may also have a bit of expectation from the judges and lawyers at least to know the basic features of heredity, genetics and the functions of a geneticist, molecular biologist, psychologist, forensic psychiatrist and all other relevant stakeholders in genetics. Judges should have an open mind towards exploring science. After all judges and not lawyers make changes since they interpret the law. Surely it is not an excuse for lawyers to deprive themselves of any of the knowledge in science, they should need to read up new areas involving science and criminal law. Where research is necessary, they should so conduct.

Nigerian Scientists in the Bio-Science field should strive to contribute their quota to scientific knowledge and crime. They should demystify superstition and encourage more interest in science by writing simplified science books for legal practitioners, so as to encourage them to develop scientific interest in specialised areas like psychiatry, forensics, neuroscience, microbiology and genetics. We should also encourage more of medico-legal seminars and conferences in the country. Moreover,

[89] See Alex Hardy, 'TV Review: Code of a Killer; How to be a Young Billionaire' *The Times* (London, 7 April 2015) 10.

[90] Rothenberg and Wang (n 27); Also see Transcript of 'Genes on Trial' <http://www.pbs.org/fredfriendly/ourgenes/transcripts/GENES_TRANSCRIPT.pdf.> accessed on 10 April 2015.

there must be a continuous review and reform of Nigerian criminal laws to give attention to genetics. In some western countries, police detectives are pushing for more genetic tests to aid them in investigating and prosecuting crimes. For example, in the affluent village of Bosham in England, it was reported that the police were making house-to-house inquiries following a voluntary DNA screening in January 2015 for every adult male, after a grandmother was murdered.[91] More still, government should continuously give priority to programmes that will encourage research and make more efforts in its pursuit for educational objectives provided in Section18 (2) of the 1999 Constitution of Nigeria which states that the government shall promote science, technological and scientific research through sufficient funding.[92]

[91] 'Valerie Graves Murder: DNA Screening for Men in Bosham' (*BBC*, 21 January 2015) <https://www.bbc.com/news/uk-england-sussex-30011533> accessed 24 April 2015.

[92] CFRN 1999, cap 2.