



## THE ‘WARRIOR GENE’ AND THE MĀORI PEOPLE: THE RESPONSIBILITY OF THE GENETICISTS

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### Keywords

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### ABSTRACT

The ‘gene of’ is a teleosemantic expression that conveys a simplistic and linear relationship between a gene and a phenotype. Throughout the 20th century, geneticists studied these genes of traits. The studies were often polemical when they concerned human traits: the ‘crime gene’, ‘poverty gene’, ‘IQ gene’, ‘gay gene’ or ‘gene of alcoholism’. Quite recently, a controversy occurred in 2006 in New Zealand that started with the claim that a ‘warrior gene’ exists in the Māori community. This claim came from a geneticist working on the MAOA gene. This article is interested in the responsibility of that researcher regarding the origin of the controversy. Several errors were made: overestimation of results, abusive use of the ‘gene of’ kind of expression, poor communication with the media and a lack of scientific culture. The issues of the debate were not taken into account sufficiently, either from the political, social, ethical or even the genetic points of view. After more than 100 years of debates around ‘genes of’ all kinds (here, the ‘warrior gene’), geneticists may not hide themselves behind the media when a controversy occurs. Responsibilities have to be assumed.

### INTRODUCTION

The ‘crime gene’, the ‘poverty gene’, ‘IQ gene’, ‘gay gene’, the ‘gene of alcoholism’, etc. are all artifacts of 20th century genetics. The geneticists continuously looked for those fundamental determinants of human behaviour. Some people had political reasons, or were guided by eugenic or racist ideologies, while others were driven by personal motivations, or convinced by the scientist utopias of a better world thanks to science. The reasons are probably as numerous as people are.

Thus the term ‘gene of’ is very common. In most cases it is a clear abuse of language, since back in the 1970s it was already shown that the link between a gene and a phenotype was far from simple. In other cases, these abuses are due to researchers who overstate the results of their research studies. Sometimes a journalist misinterprets, or sensationalizes, or oversimplifies the scientific data, inviting the public to draw the wrong conclusions. None of these errors exclude the others. In other cases, it is neither an error nor an abuse. This expression may

reflect a teleosemantic use of the concept ‘gene’. Defined by a function, it may be a tool for work and for communication that assumes its oversimplification. The concept of ‘gene of’ is then saved thanks to pragmatic reasons.<sup>1</sup> But what is the price? The teleosemantic use may indeed be justifiable under certain circumstances and within the limited conditions of the laboratory. In any case, outside this framework, I argue that its practical utility is not sufficient to excuse its potential danger.

The past 100 years are full of controversies about genes and violence. The debates have appeared again and again, even recently. Their recurrence is a sign of the symbolic power of the ‘gene of’ expression. And the danger comes from its power in the popular culture. Geneticists must be aware of this long story of the ‘gene

<sup>1</sup> R. Falk. What is a Gene? *Stud Hist Philos Sci* 1986; 17: 33–173; L. Moss. 2001. Deconstructing the Gene and Reconstructing Molecular Developmental Systems. In *Cycles of Contingency, Developmental Systems and Evolution*. S. Oyama et al., eds. London: MIT Press: 85–97; Laurence Perbal. 2011. *Gènes et Comportements à l’Ere Postgénomique*. Paris: Vrin.

of' and there is no excuse for those still fueling this non-debate. I want to illustrate my argument with the controversy that shook New Zealand in 2006 concerning the 'warrior gene' and the Māori people.

## 'WARRIOR GENE'

In 2006, during the 11th International Congress of Human Genetics in Brisbane, Australia, a team of researchers from the Institute for Environmental Science and Research (ESR) – the main scientific council of the Ministry of Health in New Zealand – announced that they had identified a genetic polymorphism associated with higher levels of MAO in Māori people. The Māoris are the indigenous Polynesian peoples of New Zealand. They arrived on the islands in successive waves starting in the eighth century. The initial objective of the geneticists was to analyze a gene for MAO as a marker for alcohol and tobacco dependence.

This kind of research is quite common since monoamine oxidase (MAO) has been studied for a long time and had already been linked to addictive behaviours. These are the enzymes responsible for the metabolism of neurotransmitters – serotonin, dopamine and adrenaline – and therefore, they can influence a person's mood. Indeed, MAO inhibitors (e.g. moclobemide) are used to treat depression and tobacco dependence. Since the 1990s, researchers have been interested in a locus that produces a variant of this brain enzyme, the MAOA (monoamine oxidase A).<sup>2</sup> An allele containing a polymorphism (allele 3-MAOA30bp repeated-rpt) is linked to low levels of MAOA and high levels of dopamine.<sup>3</sup>

In New Zealand, the Māori are stigmatized with their relationship to addictive behaviours: alcohol, tobacco and especially problem gambling. That last seems to be taken particularly seriously in New Zealand. The 2006/2007 report of the health services notes that nearly 3% of adults (87,000 people) had experienced gambling problems in the past 12 months. Māori adults are 3.5 times more likely than other New Zealanders to develop such problems. With the *Gambling Act* in 2003, the Health Ministry became responsible for the prevention and treatment of gambling problems. In 2010, it developed a strategic plan over six years: 'Preventing and Minimizing Gambling Harm: Six-year Strategic Plan 2010/11–2015/

16'. The Ministry sponsored the HSC (The Health Sponsorship Council), a New Zealand government agency that deals with health promotion, to conduct research on this issue.<sup>4</sup>

So, the study of the ESR showed that the allele of 'low activity' MAOA – 3-repeated – is present in 56% of the Māoris in their sample.<sup>5</sup> In a sample with 17 people who have eight Māori great-grandparents (reducing the European admixture), the frequency is even increased compared with non-Māori carriers. The sample size is very small (46) but the percentage is still twice as high as the frequency in Caucasian people<sup>6</sup> and consistent with the data on Pacific Islanders.<sup>7</sup>

During the 11th International Congress of Human Genetics in Brisbane, one of the team members, Rod Lea, gave a talk on these results followed by an interview with the Australian press. A really major controversy followed because in this interview, attention was quickly directed not to the behaviours of addiction but to the fact that this polymorphism has been associated – since 1990s – with aggressive and antisocial behaviours.

Indeed, as already underlined, many studies have shown a statistical (positive correlation) or causal relationship (knock-out experiments in mice) between low levels of MAOA and aggressive behaviour, mental retardation, lack of self-control, addiction and risk-taking behaviours.<sup>8</sup> This is true mostly for Caucasian men, while the effect was not evident in a cohort of American

<sup>4</sup> Available at: <http://www.hsc.org.nz/our-activities/problem-gambling> [Accessed 15 Nov 2011].

<sup>5</sup> R. Lea & G. Chambers. Monoamine Oxidase, Addiction, and the 'Warrior' Gene Hypothesis. *J NZMA* 2007; 120: 1250.

<sup>6</sup> A. Caspi et al. Role of Genotype in the Cycle of Violence in Maltreated Children. *Science* 2002; 297: 851–854.

<sup>7</sup> Sabol et al., *op. cit.* note 3, pp. 273–279.

<sup>8</sup> Caspi et al., *op. cit.* note 6, pp. 851–854; J. Kim-Cohen et al. MAOA, Maltreatment, and Gene-Environment Interaction Predicting Children's Mental Health: New Evidence and a Meta-Analysis *Mol Psychiatry*, 2006; 11: 903–913; O. Cases et al. Aggressive Behaviour and Altered Amounts of Brain Serotonin and Norepinephrine in Mice Lacking MAOA, *Science* 1995; 268: 1763–1766; J.C. Shih & R.F. Thompson. Monoamine Oxidase in Neuropsychiatry and Behaviour. *Am J of Hum Genet* 1999; 65: 593–598; T.K. Newman et al. Monoamine Oxidase A Gene Promoter Variation and Rearing Experience Influences Aggressive Behaviour in Rhesus Monkeys. *Biol Psychiatry* 2005; 57: 167–172; A.F. Jorm et al. Association of a Functional Polymorphism of the Monoamine Oxidase A Gene Promoter with Personality and Psychiatric Symptoms. *Psychiatr Genet* 2000; 10: 87–90; A. Parsian & C.R. Cloninger. Serotonergic Pathway Genes and Subtypes of Alcoholism: Association Studies. *Psychiatr Genet* 2001; 11: 89–94; S.B. Manuck, J.D. Flory et al. A Regulatory Polymorphism of the Monoamine Oxidase-A Gene may be Associated with Variability in an Aggression, Impulsivity, and Central Nervous System Serotonergic Responsivity. *Psychiatry Res* 2000; 95: 9–23; J. Samochowiec et al., Association of a Regulatory Polymorphism in the Promoter Region of the Monoamine Oxidase A Gene with Antisocial Alcoholism. *Psychiatry Res* 1999; 86: 67–72.

<sup>2</sup> H.G. Brunner et al. Abnormal Behaviour Associated with a Point Mutation in the Structural Gene for Monoamine Oxidase A. *Science* 1993; 262: 578–580.

<sup>3</sup> S.Z. Sabol, S. Hu & D. Hamer. A Functional Polymorphism in the Monoamine Oxidase A Gene Promote. *Hum Genet.* 1998; 103: 273–279.

non-whites.<sup>9</sup> For this reason, in 2004 at the Annual Meeting of the American Association of Physical Anthropologists in Tampa, Florida, this gene was named the 'warrior gene' by science writer Ann Gibbons.<sup>10</sup>

The 'warrior gene' is not a newcomer. It is the direct descendant of the 'crime gene' that erupted in the 1990s, and the latter in turn is the heir of the early research studies on crime in the late 19th century.

At that time already, eugenics was an ideology based on the belief that biological inheritance determines not only physical but also moral or behavioural characteristics. Many researchers argue for example that poor people generate poor people and criminals generate criminals. From the late 19th century, family studies over several generations have tried to show the biological inheritance of crime (Jukes family, Kallikak family). In addition, in the 1910s, crime was often associated with a lack of intelligence. For example, the American psychologist Henry H. Goddard (1866–1957) believed that children become criminals because they fail at school, they become poor because they are unable to earn money and girls are prostitutes because of a lack of intelligence. In 1965, the very controversial 'chromosome of crime' appeared in the landscape of genetics by showing a link between the extra Y chromosome of men with XYY syndrome and criminal behaviour.<sup>11</sup> In 1992, the Bush Administration initiated the 'Violence Initiative', a program to search for a genetic predisposition to violence and criminal behaviours. In 1995, the University of Maryland organized a lecture series questioning the links between genes and crime. The controversy that followed was very heated. Starting in 2005 the current President of the French Republic, Nicolas Sarkozy, supported a 'crime prevention' project that promotes early detection of disorders at the age of three years. He referred to a report by the 'Institut national de la santé et de la recherche médicale' (INSERM), 'Mental disorders, screening and prevention in children and adolescents' (*Troubles mentaux, dépistage et prévention chez l'enfant et l'adolescent*) published in September 2005, which shows that some antisocial traits, such as 'emotional coldness', 'disobedience' and 'impulsivity', were hereditary to a high degree and could be predictive of future delinquency. This reference to a genetic determinism of crime was a scandal in France. More recently again, in 2009, a team of researchers in Florida introduced the 'gangsta gene',

<sup>9</sup> C. Spatz-Widom & L.N. Brzustowicz. MAOA and the 'Cycle of Violence.' Childhood Abuse and Neglect, MAOA Genotype, and Risk for Violent and Antisocial Behaviour. *Biol Psychiatry* 2006; 60: 684–689.

<sup>10</sup> A. Gibbons. American Association of Physical Anthropologists meeting: Tracking the Evolutionary History of a 'Warrior' Gene *Science* 2004; 304: 818–819.

<sup>11</sup> P.A. Jacobs et al. Aggressive Behaviour, Mental Subnormality and the XYY Male. *Nature* 1965; 208: 1351–1352.

the gang version of the 'warrior gene', and it reported that people having the 'low-activity' allele of MAOA are twice as likely to join a gang as other young people.<sup>12</sup>

So, in his interview, Rod Lea clearly refers to the 'warrior gene'. He says he does not doubt – and this is where the controversy begins – that the Māoris' genetic characteristics may explain the extraordinary capacity for survival of the Māori population – a capacity that allowed them to cross the Pacific in small boats and to reach the coast of New Zealand.

Indeed, the history of the Māori people is closely related to that of their Polynesian ancestors. Their oral tradition describes the arrival of the ancestors coming from Hawaiki, a mythical homeland in the heart of tropical Polynesia, by way of the great ocean, using canoes (waka).

Then Māoris are supposed to have the 'warrior gene'. Rod Lea told the Australian Associated Press:

*Māori, being very adventurous individuals as they crossed the Pacific, have carried this gene forward and it was partly responsible for them arriving in New Zealand and surviving, (. . .) It is controversial because it has implications suggesting links with criminality among Māori people (. . .) I think there is a link, it definitely predisposes people to be more likely to be criminals and engage in that type of behaviour as they grow older.*<sup>13</sup>

## CONTEXT OF THE CONTROVERSY

Lea's assumptions correspond perfectly to the stereotypes that affect the Māori in New Zealand. Around the world, the image transmitted by the rugby team 'the All Blacks' feeds this warlike perception, and in New Zealand these stereotypes obviously have further consequences. In fact, the controversy over a supposed link between violence and Māori culture is not new.

In 1994, a film – 'Once Were Warriors' – had a considerable influence on the perception of the Māori as a heavy drinking and violent people. Through the portrait of an abusive father's family, it denounced violence against Māori women by Māori men. In addition, in June 2006, shortly before Rod Lea's conference, the country was stricken by a family tragedy that cost the lives of three-month-old Māori twins in Auckland. They had serious head injuries but the family refused to cooperate with the police. The Prime Minister at that time, Helen Clark,

<sup>12</sup> K.M. Beaver et al. Monoamine Oxidase A Genotype is Associated with Gang Membership and Weapon Use. *Compr Psychiatry* 2010; 51: 130–134. References and further reading may be available for this article. To view references and further reading you must purchase this article.

<sup>13</sup> Cited in AAP. Warrior Gene Prevalent in Māori: Study. TVNZ, 9 Aug 2006. Available at: <http://tvnz.co.nz/content/810285/425826.html> [Accessed 16 Sep 2011].

described that family as a 'Once Were Warriors type family' . . .<sup>14</sup> In fact, the New Zealand government considers domestic violence endemic and shameful. Their official statistical data show that Māori children under five years of age have a risk factor for being abused that is twice as high as that for children in other ethnic groups. Tariana Turia, co-leader of the Māori Party, shared the fact that after the interview with Lea, reporters came to ask if this gene was the reason why the Māori race is violent and why they have a high rate of crime. Indeed, governmental statistics show an overrepresentation of Māoris in the justice courts.<sup>15</sup> So the context in which Lea and Chambers' study appeared explains the scope it had in the New Zealand press.

Rod Lea and his team wrote in an article in 2007 that the journalist who conducted the interview for the APP had 'manipulated', 'misquoted' and 'misunderstood' what they said. Anyway, according to me, it seems that these researchers are not free of responsibility for several reasons.

First, they drew conclusions that were not supported by their results. And in a case as potentially controversial as this one, this was a big mistake. In their 2007 article, they wrote that their results only show the probable existence of a selective force in favor of the MAOA gene because of the difficult living conditions of the Māoris.

*It is important that the incidental formation of this 'warrior gene hypothesis' is interpreted for what it is – a retrospective, yet scientifically plausible explanation of the evolutionary forces that have shaped the unique MAOA gene patterns that our empirical data are indicating for the Māori population.*<sup>16</sup>

The narrative of the Māori people surviving in extreme conditions due to their 'warlike' genetic constitution is an attractive and easygoing sociobiological story. Perhaps it is true, nevertheless it remains not provable. In addition, Chambers and Lea point out that 56% of Māori, 59% of Africans, 61% of Pacific peoples and 77% of Chinese of their samples have the 3-repeated allele.<sup>17</sup> What about the warrior gene hypothesis for these other people? Everything suggests that this selectionist assumption has

mainly served to reinforce the relevance of their statistical results. By integrating them into a broader evolutionary narration, those statistics take a scope that goes beyond the anecdotal and real importance of their result: the presence of a polymorphism in 56% of the 46 Māoris surveyed.

Given the potentially controversial, political and racial context of their study, they should not have advanced a theory not supported by their results. This is a sensitive issue – which has been sufficiently demonstrated for over 100 years – and under these circumstances, the use of the term 'warrior gene' cannot be justified on pragmatic grounds, or moreover in a journalistic context. This is a typical pseudoscientific term that adds nothing relevant to the debate, but only plays with the imagination of the public and enhances the study in a questionable way.

Secondly, the pseudoscientific aspect of the 'warrior gene' is very clear since the social and cultural development of antisociality is particularly important. Even though we do not want to denigrate the potential importance of genetic or biological predispositions, when it comes to human behaviour, it is necessary to place individuals in their historico-cultural systems. Searching for genes related to skills is a legitimate activity, while seeking the genes of their products is not. Crime is an event, and events have no genes.<sup>18</sup> This is certainly obvious, even banal, but it is a truism that is not taken seriously enough. And given the potentially controversial context, to ignore it represents more than just naivety or clumsiness.

Of course Rod Lea acknowledges that other environmental factors may play a role, but it is saying too little when it comes to an issue such as this one. He told the National Radio in August, 2006:

*This gene has been linked to different anti-social and risk-taking behaviours, but the link has been usually quite weak, and often is only present in association with non-genetic factors – that is, other factors such as upbringing, socioeconomic circumstances, and other lifestyle factors.*<sup>19</sup>

Indeed, the existence of a gene-environment interaction for the development of antisocial behaviours was demonstrated in 2002 by Avshalom Caspi's team at Duke University in a study that remains the most developed and respected in the field today. In August 2002, *Science* published a study indicating that two different alleles of the MAOA, one highly active and the other less active, are associated with behavioural disorders, high rates of

<sup>14</sup> Newstalk ZB, NZPA. We want to Know who Killed Twins Too, Says Family, *The New Zealand Herald*, June 26, 2006. Available at: [http://www.nzherald.co.nz/nz/news/article.cfm?c\\_id=1&objectid=10388379](http://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=10388379) [Accessed 16 Sept 2011].

<sup>15</sup> Statistics New Zealand (2001). Ethnicity tables. Available at: [http://www.stats.govt.nz/methods\\_and\\_services/access-data/tables/2001-census-cultural-diversity-tables.aspx](http://www.stats.govt.nz/methods_and_services/access-data/tables/2001-census-cultural-diversity-tables.aspx) [Accessed 16 Sep 2011]; Department of Corrections (2007) Over-representation of Māori in the Criminal Justice System, an Exploratory Report. Available at: [http://www.corrections.govt.nz/\\_data/assets/pdf\\_file/0004/285286/Over-representation-of-Māori-in-the-criminal-justice-system.pdf](http://www.corrections.govt.nz/_data/assets/pdf_file/0004/285286/Over-representation-of-Māori-in-the-criminal-justice-system.pdf) [Accessed 15 Nov 2011].

<sup>16</sup> Lea & Chambers, *op. cit.* note 5, p. 1250.

<sup>17</sup> *Ibid.*

<sup>18</sup> P. Roubertoux. 2004. *Existe-t-il des Gènes du Comportement?* Paris: Odile Jacob: 213.

<sup>19</sup> National Radio Morning Report, 9 August 2006; Cited in J. Stokes 2006. Māori 'Warrior Gene' Claims Appalling, Says Geneticist. *N Z Herald*, 10 August. Available at: [http://www.nzherald.co.nz/category/story.cfm?c\\_id=204&objectid=10395491](http://www.nzherald.co.nz/category/story.cfm?c_id=204&objectid=10395491) [Accessed 15 Nov 2011].



conviction, antisocial and violent behaviour.<sup>20</sup> However, this association is highlighted when the individual carrying the ‘low activity’ allele was the victim of abuse and violence as a child. No significant correlation was observed in individuals abused in childhood producing high quantities of MAOA or in individuals not abused and producing MAOA in small quantities. It seems that the increased activity of MAOA reduces the probability that an individual who was abused as a child will develop a violent personality. The environment is then used as a lens through which to look for allelic differences. The two interacting factors affect the feelings and emotional reactions of children.<sup>21</sup>

The study is even regarded as a turning point in the history of behavioural genetics in the postgenomic era.<sup>22</sup> The bioethicist Erik Parens writes:

*It might not be an exaggeration to say that, if replicated, the Caspi-Moffitt MAOA study will turn out to have been a watershed event in the history of behavioural genetics.*<sup>23</sup>

I argue that the Lea and Chambers’ team does not seem to have taken the importance of that paradigmatic study seriously enough. Caspi identified this MAOA gene – violent environment interaction after decades of observation and after interviewing many subjects (426). And since then research studies on MAOA are extremely numerous, but the follow-up studies are not based on research that is as extensive and the replicated results are also less robust. The symbolic and epistemological importance of this study really needs to be taken more seriously. It is not enough to say that the environment plays a role – which means the environment does not just reveal the causal role of genes – it significantly modifies their effects and may be more important in the causal production of the output of interest, e.g. gambling or crime, than the genetic variations. The ‘warrior gene hypothesis’ should rather be called the ‘warrior hypothesis’ to not focus so exclusively on genetic factors.

In addition, in the case of Māori people, relevant environmental factors are obviously not lacking. The causes of violence in Māori families are particularly known as a complex mix of contemporary and cultural factors.

<sup>20</sup> Caspi et al., *op. cit.* note 6, pp. 851–854.

<sup>21</sup> R.J. Cadoret et al., Genetic-Environmental Interaction in the Genesis of Aggressivity and Conduct Disorders. *Arch of Gen Psychiatry* 1995; 52: 916–924; T.M.M. Button et al. Family Dysfunction Interacts with Genes in the Causation of Antisocial Symptoms. *Behav Genet* 2005; 35: 115–120.

<sup>22</sup> J. Tabery. Biometric and Developmental Gene-Environment Interactions: Looking Back, Moving Forward. *Dev Psychopathol* 2007; 19: 1961–1976; Laurence Perbal, *op. cit.* note 1.

<sup>23</sup> E. Parens. Genetic Differences and Human Identities: On Why Talking about Behavioural Genetics Is Important and Difficult. *Hastings Cent Rep, Supp* 2004; 34: S1–S36.

To begin with, the reference to the ‘warlike’ tradition is a key element of the current cultural structure of the Māoris.<sup>24</sup> In particular, Māori people convey the belief that traits and behaviours that are developed today are inherited from their ancestors through the ‘whakapapa’ (genealogy). The fact that risk-taking behaviours are common among Māoris is not new for them. In Māori mythology, Maui, the mythical ancestor, exhibited this trait. And the stroke of the ‘whakapapa’ has forwarded these traits to his descendants. It is the purity and sanctity of the life force of each to preserve the genealogical line.<sup>25</sup>

Then, like many indigenous peoples in the world, Māori have a low socio-economic level and the economic gap between the indigenous and non-native people has continued to widen in recent years. They are twice as likely to live below the poverty line. There are a large number of studies that have shown that crime rates as well as health problems are strongly linked to low socio-economic conditions.<sup>26</sup> Moreover, the Māoris are not the only indigenous people to be accused of violence: Inuit, Métis, Indians of Canada<sup>27</sup> and Australian Aborigines<sup>28</sup> are similarly accused. Long before the 3-repeat allele of MAOA, the common factors among all these peoples were mainly how the colonizers perceived them, dispossessed them of their land, impoverished and assimilated them, the uprooting of families, the search for work and pressures due to poverty and overcrowded housing.

So, looking for genetic differences for behavioural traits among ethnic minorities remains highly controversial and risky from an ethical point of view. Moreover, in terms of prevention of violence and addictions, highlighting biological predispositions regardless of environmental conditions in which they interact is proving to be of zero interest. To protect individual participants in research involving human subjects,

<sup>24</sup> T. Kruger et al. 2004. Transforming Whānau Violence – A Conceptual Framework. A report from the former Second Māori Taskforce on Whānau Violence. Wellington: Te Puni Kokiri.

<sup>25</sup> S.L. Ferguson. Peer Commentary, Once Were Warriors, or Warriors Still? *Mai Review* 2009; 2.

<sup>26</sup> I. Kawachi, B.P. Kennedy & R.G. Wilkinson. Crime: Social Disorganization and Relative Deprivation. *Soc Sci Med* 1999; 48: 719–731; P. Reid, B. Robson & C.P. Jones. Disparities in Health: Common Myths and Uncommon Truths. *Pacific Health Dialog* 2000; 7: 38–47; P. Crampton, C. Salmond & R. Kirkpatrick. 2004. *Degrees of Deprivation in New Zealand*, (2nd edn.). Auckland: David Bateman.

<sup>27</sup> L. Chartrand & C. McKay. A Review of Research on Criminal Victimization and First Nations, Métis and Inuit Peoples 1990 to 2001. Report prepared for the Department of Justice Canada. Jan 2006. Available at: [http://www.justice.gc.ca/eng/pi/rs/rep-rap/2006/rr06\\_vic/index.html](http://www.justice.gc.ca/eng/pi/rs/rep-rap/2006/rr06_vic/index.html) [Accessed 15 Nov 2011]; G. St-Jean. 2000. Aboriginal Peoples and the Criminal Justice System. A special issue of the *Bulletin, Ottawa* May 15. Available at: <http://www.ccja-acjp.ca/en/aborit.html> [Accessed 15 Nov 2011].

<sup>28</sup> T. Johnston. 2007. Far-Reaching Policy for Aborigines Draws their Fury, *NYT* 24 Aug. Available at: <http://www.nytimes.com/2007/08/24/world/asia/24outback.html?scp=1&sq=indigenous%20domestic%20violence&st=cse> [Accessed 15 Nov 2011].

ethical principles imply the provision of informed consent. Before taking part in research, individuals are made fully aware of the purpose of the study and its potential harms and benefits. Were the participants in Lea's research aware that the conclusions may include a 'warrior gene hypothesis' generalized to the entire Māori population?<sup>29</sup>

Anyway, the ESR has since established a working group comprising Māori academics, members of 'iwi' (tribes), researchers and scientists. The purpose of this group is to develop procedures for best practices in genetic research involving the Māori, and working on the information given to participants, the use of data and dissemination of results.<sup>30</sup>

## CONCLUSIONS

Human genetics is inherently an overdetermined science, and therefore, the researcher's responsibility must go beyond the boundaries of the laboratory, and an education in media management is essential. The geneticist Peter S. Harper writes that a continuation of vigilance, scientific openness, humility, skepticism of extravagant claims, and valuing of the individual are essential to prevent major abuses in the future.<sup>31</sup> The 'warrior gene' controversy in Māori people is a relevant exemplar. Contrary to Rod Lea's statements, it is not the only product of a sensationalizing journalism. In my opinion, the geneticists in question made several errors and took none of Harper's precautions.

Firstly, Lea and his colleagues overvalued their results by including them in a non-provable sociobiological narration: the hypothesis of the 'warrior gene'. It is obviously pseudoscience and their conclusions show a lack of vigilance and skepticism about their results.

Secondly, they did not take the importance of Caspi's paradigmatic research on the interactions between genes and environment for violence seriously enough. I use the term 'paradigm' because Caspi has initiated a new way to highlight this importance in behavioural genetics by really respecting the importance of environmental

factors. The New Zealand researchers did not take sufficiently into account research studies done on the social and cultural determinants of violence and it is their responsibility for having said too little about post-genomic gene-environment interaction effects. Cultural, social and historical influences on violent behaviours are not anecdotal. They merit more than a quote in one or two sentences in a paper.

Moreover, Lea and his team lacked humility and made generalizations from the research participants to the entire Māori population despite the lack of evidence for association between the two.<sup>32</sup> They did not value the individual enough and in such a controversial context, it was indispensable.

Finally, the social and cultural context in New Zealand explains (probably) why those researchers made pseudo-science. The controversy on Māori people, violence and risk-taking behaviours is not new and it is the reason why their research included the exploration of the 'warrior gene hypothesis' and their conclusions included too many extravagant claims on that topic. It is their mistake for not having taken seriously enough the context in which their study appeared and the dangerousness and banality of racial stereotypes. Though that kind of controversy is a hundred years old, they clearly showed a lack of knowledge of the history of genetics.

So, according to Rod Lea, the media is to blame for the controversy that has developed in 2007 in New Zealand about the 'warrior gene' and the Māori people, but in my opinion it was the scientists who lacked humility, made several errors, and provided the material for the controversy.

And the use of a 'gene of' kind term – 'warrior gene' – is the link between all those errors and should be avoided.

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<sup>29</sup> P. Crampton & C. Parkin. Warrior Genes and Risk-Taking Science. *N. Z. Med. J.* 1997; 120: 1250, U2439.

<sup>30</sup> Lea & Chambers, *op. cit.* note 5.

<sup>31</sup> P.S. Harper. 2008. *A Short History of Medical Genetics*. Oxford: Oxford University Press: 426.

<sup>32</sup> Crampton & Parkin, *op. cit.* note 30: 1250, U2439; T. Merriman & V. Cameron. Risk-Taking: Behind the Warrior Gene Story. *NZ Med. J.* 2007; 120: 1250.