



Thoughts on a legacy

Gregor Johann Mendel, the ‘father of modern genetics’, was born 200 years ago, on 20 July 1822. In commemoration of this milestone, in our July issue we reflect on his legacy and the field’s responsibility around potential uses and abuses of genetics and genomics research.

July 2022 will see the bicentenary of the birth of Gregor Mendel. To commemorate this milestone, the July issue of *Nature Reviews Genetics* includes two Comment articles^{1,2} and a Perspective³ that reflect on Mendel’s work and a scientific legacy that has shaped our field.

Aside from being known as the father of modern genetics, Mendel is most commonly cited as a paragon of the obscure science innovator given that his ideas were not widely accepted or recognized until the turn of the twentieth century, some 30 years after publication of his work on pea plants. The rediscovery of Mendel’s laws of inheritance in the early 1900s coincided with a rise of the eugenics movement, which co-opted Mendelian genetics as a new scientific foundation, wrongly applying dominant/recessive schemes to explain complex human traits, behaviours and abilities. Eugenics would go on to feed myriad social and political agendas, including US sterilization and immigration laws and Nazi policies. For example, eugenicists supported and pushed for the 1924 Johnson–Reed Immigration Act, which greatly curtailed immigration into the US from European nations whose people were viewed as non-white⁴.

Rather than a relic of the past, eugenic myths and scientific racism, whereby the methods and legitimacy of science are misappropriated to argue for the superiority of white people and the inferiority of non-white people, manifest to this day. In May 2022, a white supremacist murdered 10 people in Buffalo, New York, in a premeditated hate crime targeting a predominately Black neighbourhood. A manifesto purportedly written and posted by the suspect refers to the anti-Black, anti-Jewish [white replacement conspiracy theory](#), which has been implicated in several other heinous white supremacist mass murders and terrorist attacks over the past decade, including in the US, Europe and New Zealand. His manifesto is reported to grossly misrepresent several scientific papers as evidence for white genetic supremacy⁵.

As the COVID-19 pandemic has shown, science misinterpretation and disinformation can cause extreme harm. While scientists need to have greater awareness of how some of their findings can be twisted, they should be free to pursue research without fear of repression or censorship. Science, and the study of human genetics in particular, is no ally to fascist and racist views. Race is a social construct, not a genetics-based one. Yet, even the most basic science can be mischaracterized by those

with a social or political agenda. The appropriation of genetic concepts or their distortion to promote racist ideologies is not new, and one of many factors underlying the persistence of racism.

Researchers have a responsibility to reflect on the ethical implications and potential consequences of their work and consider how they present it to the scientific community and the public. But beyond the decision of Institutional Review Boards, who review and monitor biomedical research involving human individuals, who defines potential benefit versus potential harm? Who is able to anticipate all possible future uses (and misuses) of their research? What if initial assessments turn out to be wrong? Could Mendel have anticipated how the concepts described in his paper would go on to fuel racist ideologies? Should he not have published his work if he had?

Concerted efforts should be made to anticipate and address ethical, legal and social implications, working with bioethicists and, where applicable, under-represented communities to prevent predictable misrepresentations. Editors too have a role for harm avoidance in research, which is why Springer Nature is developing guiding principles around the consideration of risks and benefits to underlie the editorial process of all forms of scholarly communication in our publications. Given the history of misuse of genetics concepts over the past two centuries, the use of racial and ethnic categories in genetics research in particular requires careful consideration. Geneticists have a particular responsibility to engage with the field and public to build genetic literacy, addressing misconceptions about race, ethnicity and ancestry, to ensure the responsible use of genetic and genomic information now and in the future.

1. Zschocke, J., Byers, P. H. & Wilkie, A. O. M. Gregor Mendel and the concepts of dominance and recessiveness. *Nat. Rev. Genet.* <https://doi.org/10.1038/s41576-022-00495-4> (2022).
2. Makani, J. et al. From Mendel to a Mendelian disorder: towards a cure for sickle cell disease. *Nat. Rev. Genet.* <https://doi.org/10.1038/s41576-022-00498-1> (2022).
3. Nasmyth, K. The magic and meaning of Mendel’s miracle. *Nat. Rev. Genet.* <https://doi.org/10.1038/s41576-022-00497-2> (2022).
4. National Human Genome Research Institute. *Eugenics: Its Origin and Development (1883–Present)*. <https://www.genome.gov/about-genomics/educational-resources/timelines/eugenics> (2022).
5. Stanley, J. *Buffalo shooting: how white replacement theory keeps inspiring mass murder*. <https://www.theguardian.com/commentisfree/2022/may/15/buffalo-shooting-white-replacement-theory-inspires-mass> (2022).

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