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Testimony of Rep. Sam Zager in support of

LD 1601 Resolve, To Establish an Advisory Panel To Study the Implications of Genome-editing Technology for the Citizens of the State

Before the Joint Standing Committee on Health and Human Services

May 4, 2021

Good morning Senator Claxton, Representative Meyer, and esteemed colleagues on Health and Human Services. For the record, I am Representative Sam Zager of District 41 in Portland, and I am pleased to present this resolve to create a temporary advisory panel to study the implications of gene editing technology in Maine.

With all the important bills the 130th is considering, and all the weighty things in the news, it is easy to miss the fact that we are witnessing a *technological advancement for the ages*: CRISPR-Cas9 is a molecular tool that enables someone to edit genetic material like we all edit our documents with word processing software.¹ It's being used every day in Maine and around the world, and today you'll hear from scientists doing so.

Humans now have direct, precise, accurate, and inexpensive non-breeding control over which genes and therefore which traits are passed from one generation to another--in any species. For the first time since life began on earth, this power is in mortal hands.²

Alarmed by the prospects, the international scientific community put a halt to *human* gene editing in cells that would be passed to the next generation. (Dr. George Daley, Chair of the National Academy of Science Committee on Emerging Science, Technology, and Innovation

¹ CRISPR stands for Clustered Regularly Interspaced Short Palindromic Repeats. The CRISPR-Cas9 molecule is a protein discovered in bacteria, which the bacteria use to "remember" deadly viruses in order to defend against them.
<https://medlineplus.gov/genetics/understanding/genomicresearch/genomeediting/>

² "Evolution" in the field of biology is a change in prevalence of a given variety of a particular gene (a.k.a. allele) frequency over time, from one generation to another. It does not assume "improvement" or "advancement," but rather suitability to the particular pressures on survival at that particular time and place. Other notions of "evolution" exist in common vernacular, but this debate involves the standard use in peer-reviewed scientific literature.

discussed this in a brief video which I've shared with the committee, and is at the bottom of my written testimony.³⁾

That still leaves lots of possibilities in so-called *somatic* (non-heritable) human cells, and all cells in other species. For instance, we can eradicate deadly and cruel single-gene diseases like cystic fibrosis, sickle cell anemia, and hemophilia. It also holds promise for addressing multi-factorial diseases such as cancer, heart disease, mental illness, and HIV infection.⁴ The preamble of LD 1601 elaborates on many implications for this technology, e.g. health, the environment, our economic viability, and national security, to name a few. Likewise, there are significant ethical considerations, for humanity has stumbled occasionally when deciding what traits -- and who with those traits -- are "worthy."

I'm not saying that it's up to Maine to figure this out for humanity; This resolve simply tries to frame the issue and point out that Maine has an opportunity to be a leader. We can begin to have the broad public discussion that the scientific community has been having, as it is asking non-scientists join.^{5,6}

LD 1601 proposes to do just that. With it, the Legislature would convene a temporary panel for a little more than one year. The panel would study the implications of gene-editing technology and the legislative, administrative, appropriations, or other steps that the State should take to *capitalize on the tremendous potential, and avoid the hazards, of this technology*. It would submit a report by the end of 2022 including its findings and recommendations, including suggested legislation for the 131st Legislature.

There is a lot of human suffering caused by disease that we can help alleviate in Maine. I will leave it to others to elaborate on this in testimony.

I also submit that we as a state can't afford not to have a plan here.

* Every two years, the Milliken Institute publishes rankings of its State Technology and Science Index, an objective grade of each state's capacity for achieving prosperity through scientific discovery and technological innovation.⁷ I'm sorry to share that we are doing very poorly, ranked 43rd in 2020, a fall of five spots since 2018.

* The National Science Foundation published findings of states' investment in research and development and similarly found Maine lacking.⁸ Over the course of 16 years, the median US investment in R&D increased by 38% but Maine only increased by 8.6%. We may never be able

³ Chinese scientist "He [Jiankui] shocked the world's scientists in November 2018 when he announced that his team at Southern University of Science and Technology in Shenzhen had used the CRISPR gene-editing system to edit DNA in human embryos to make them less susceptible to HIV." This far exceeded international norms, and the international scientific community admonished He. A Chinese court sentenced him in 2020 to three years in prison of "illegal medical practice."

<https://www.nature.com/articles/d41586-020-00001-y>

⁴ <https://medlineplus.gov/genetics/understanding/genomicresearch/genomeediting/>

⁵ <https://www.nejm.org/doi/full/10.1056/NEJMp1900504>

⁶ <https://science.sciencemag.org/content/362/6414/527.summary>

⁷ <https://milkeninstitute.org/sites/default/files/reports-pdf/State-Tech-Science-V6.pdf>

⁸ <https://nsf.gov/nsb/sei/one-pagers/state/2020/Maine.pdf>

to reach California or Massachusetts, but North Dakota increased by 153% and Wyoming increased by 243%.

If we don't jump deeper into the science and tech economy soon, we will be selling our future short. Researchers in Maine are doing incredible work, and we'll hear from some terrific ones today, but the Legislature could do more to help. Genomic science presents a fantastic opportunity.

We can chart a course to educate generations of Mainers in math, science, and engineering; to attract public and private capital to Maine institutions like the University of Maine system and private colleges like Colby; as well as Jackson Labs, MDI BioLab, Bigelow Labs, the Roux Institute; and others. We can be at the forefront of blending scientific inquiry and bioethics, benefiting our state and humanity at large.

The scientific community literally is asking for conversations in jurisdictions outside of itself. We can nurture a thoughtful conversation about how we can do the most for Maine and the people who live and will live here. We can be proactive.

Tech-rich Washington State is the only other state legislature that I know of that is as far along as Maine is on this. Imagine if, in 1970, someone in the Maine Legislature said, "Computers are going to be really big, and will affect just about everything in our society; let's think about how Maine could be a leader in that!" Would the world know the Kennebec Valley today, like they know Silicon Valley?

That is the sort of moment we are in regarding gene editing.

This resolve doesn't take a position on any particular course of action regarding the issues raised by gene-editing technology; it merely suggests a way to develop a plan for the benefit and future of Maine. If anything that this hearing brings up strikes a chord with you or your constituents, then it underscores the importance of convening this panel.

Thank you for your time and consideration. I'd be happy to answer questions.

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A recent award-winning documentary film, *Human Nature*, portrays some of the important issues CRISPR-Cas9 raises. A trailer is viewable at https://www.youtube.com/watch?v=_1UkCfDnn6c

Dr. George Daley, Dean of Harvard Medical School, Chair of the National Academy of Science Committee on Emerging Science, Technology, and Innovation, one of the conveners of the two international conferences in Washington DC (2015) and Hong Hong (2018) about gene editing, submitted this video testimony about LD 1601.

<https://harvard.zoom.us/rec/share/DTyDWUwvaKE9JIP2paxkF5Vuy6Nm0JeuH-K-nVIWYEDTJ0KN3HGn4pUMTA73xqaw.kh4qKrJ9Cew5ZRhd?startTime=1620005417000>