BRIEFING PAPER

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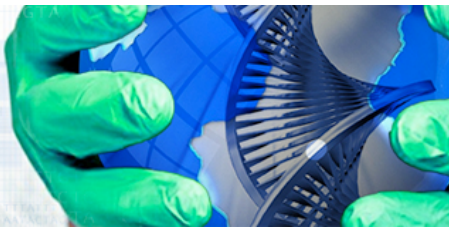
CSIRO planning US military funded genetic extinction experiments in WA



CSIRO and the University of Adelaide are being paid by the US military to conduct genetic experiments to drive species to extinction

A raft of emails obtained through a Freedom of Information request (The Gene Drive Files) have revealed that researchers at CSIRO and the University of Adelaide are part of a US military funded global network researching a risky new genetic modification (GM) technique referred to as gene drives. The intention is to use the technique to drive certain pest species - such as mice - to extinction in certain areas.[1]

Defence Advanced Research Projects Agency (DARPA – the US military's research arm) is contributing US$6.4M to fund the Genetic Biocontrol of Invasive Rodents Program (GBIRd). This is being spread between the CSIRO, the University of Adelaide, several US research institutes and the NGO Island Conservation.

The intention is that Australia be used as a testing ground for the dangerous new technology. The GBIRd team are coordinating with Keith Morris from the Western Australia (WA) Department of Parks and Wildlife[2] to identify potential islands in WA to use as potential test sites to release the gene drive mice.[3]

The CSIRO is also planning community engagement "as part of a wider effort to gain social license for environmental applications of synthetic biology technologies".[4] CSIRO has allocated $3.5M for community/stakeholder research related to synthetic biology and is attempting to secure more money from DARPA specifically for this work on the GBIRd project.[5]

This is happening at the same time as the Government is planning to deregulate a range of new genetic engineering techniques used in synthetic biology.[6] These will be entering the environment and our food chain with no safety testing.[7] CSIRO scientist and GBIRd member Dr Mark Tizard is currently one of the four expert advisors on the Government's 2017 Gene Technology Scheme Review Expert Advisory Panel. This review is examining gene drives and other synthetic biology applications.[8]

What is synthetic biology?

Synthetic biology is an extreme form of genetic engineering that involves re-engineering and designing genes to create new synthetic organisms that do not exist in nature. One of the most controversial applications of synthetic biology is the gene drive.

What a gene drive does is simple: it ensures that a chosen genetic trait will reliably be passed on to every individual in the next generation and every generation thereafter. The effect is that the engineered trait is driven through an entire population, re-engineering not just single organisms but enforcing the change in every descendant – re-shaping entire species and ecosystems at will. For example, the University of Adelaide's role in the GBIRd project is to try to create a gene drive using the new genetic modification (GM) technique CRISPR to engineer mice to only produce male offspring.[9] This could potentially rapidly drive the species to extinction.

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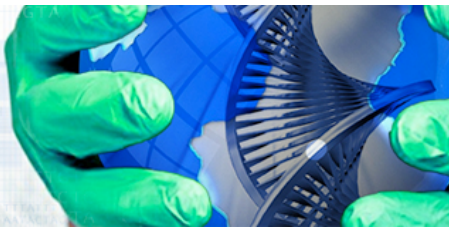


What are the risks associated with gene drives

Gene drives carry the same biosafety risks that other genetically modified organisms (GMOs) carry and considerably more. We know the track record of GMOs acting in unexpected ways and causing a variety of environmental harms, while not delivering on their promised benefits. Gene drives are designed not only to spread rapidly through populations. There is nothing in the natural world to compare them to and that limits our capacity to predict their behavior.

Because of their serious and potentially irreversible threats to biodiversity – as well as national sovereignty, peace and food security – Southern countries and over 170 organisations have called for a UN moratorium on gene drives.[10] Leading proponents of gene drives have also now said that they are too risky to release in the wild.[11]

Gene drives are a potential dual use technology

Gene drives are a classic 'dual use' technology, meaning that gene drives developed for one use could also be used as a weapon or biological agent. This is clearly why the US military is funding this research. For example, work is already underway to use gene drives to eradicate parasitic worms. The same technology could be used to make them spread disease or toxins. Gene drive yeasts have also been created in the lab and these could be engineered to be harmful to humans. Gene drives could also be released into agricultural fields to attack a country's food production. And gene drive mosquitoes and other insects could be engineered to spread lethal toxins in their bite. In any conversation about gene drives we must understand the potential risks we are creating and our capacity to control them.

The US military is one of the biggest funders of gene drive research globally

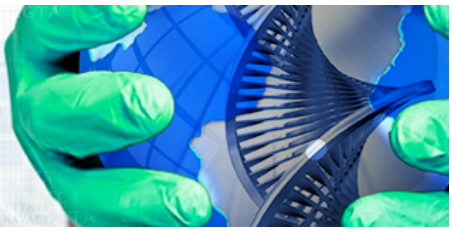
The US Defence Advanced Research Projects Agency (DARPA) has sunk approximately 100 million dollars into gene drive research.[12] - far more than previously reported[13] - making them probably the largest single funder of gene drive research on the planet.[14]

Who is involved in GBIRd in Australia?

CSIRO and the University of Adelaide are the two Australian partners in GBIRd. GBIRd associates from CSIRO include: Peter Brown, Tanja Strive, Mark Tizard, Andy Sheppard, Steve Henry, Geoff Hosack, Owain Edwards and Peter Caley[15]

GBIRd associates from the University of Adelaide include Dr Paul Thomas and Phill Cassey.

Peter Brown and Paul Thomas are members of the GBIRd steering group. In the GBIRd partnership Paul Thomas has responsibility for developing the gene drive in mice using CRISPR; Owain Edwards is responsible for Australian regulation; Keith Hayes is responsible for risk assessment; and Peter Brown is responsible for Australian engagement.[16]



Geoff Hosack from CSIRO was also paid by the US military to take part in a gene drive breakout group in a closed US military workshop in Boston and a Syn Bio Workshop in Lexington, Massachusetts in May 2017.[17]

What are the roles of CSIRO and the University of Adelaide in GBIRd?

Manipulating the public debate

CSIRO's role in GBIRd, as outlined in the project Memorandum of Understanding includes: "Develop and implement an Australian Stakeholder/Community/Public Engagement Plan to evaluate the potential for social acceptance of this technology." According to the FOI documents "Community engagement is planned by CSIRO in Australia as part of a wider effort to gain social license for environmental applications of synthetic biology technologies."[18]

CSIRO has allocated $3.5M for community/stakeholder research related to synthetic biology and FOI documents reveal that CSIRO's Owain Edwards intends to "attempt to leverage a co-investment from DARPA's LEEDR [Legal, Ethical, Environmental, Dual Use, and Responsible Innovation] funding to direct a portion of this investment specifically to support the GBIRd project."[19]

Dr Mark Tizard from CSIRO has secured media coverage on the issue - with a number *of Radio National* programs running favourable stories.[20]

In May 2017, the Australian Academy of Sciences (AAS) released a report on gene drives which claimed that "Synthetic gene drives have the potential to solve seemingly intractable problems in public health, environmental conservation and agriculture' and called for "resources be provided to study synthetic gene drives". It also called for any decision to release a synthetic gene drive "to be made on a case-by-case basis" – in marked contrast to global calls from Southern countries and over 170 organisations for a UN moratorium on gene drives.[21] AAS has called for a "national discussion" on gene drives. However, surely if we are to have a genuine societal discussion on gene drives the logical starting point should be whether this is a technology that should be used at all. Instead, the FOI documents show that GBIRd is already investigating islands in WA for an environmental release.

Of the 11 individuals in the working group that drafted the paper, 3 work directly for CSIRO on the GBIRd project: Andy Shepherd, Owain Edwards (responsible for Australian regulation) and Keith Hayes (responsible for risk assessment).[22] [23] TJ Higgins is the former Deputy Chief of CSIRO's Plant Industry Division and works on GM crops; and Oliver Mayo is an Honorary Research Fellow CSIRO Animal, Food and Health Sciences and an Adjunct Professor in the Faculty of the Sciences, University of Adelaide, South Australia.[24]

Despite the CSIRO's clear involvement in the report, neither the report itself - or the media release for the report make any reference to the organisation's involvement.[25]

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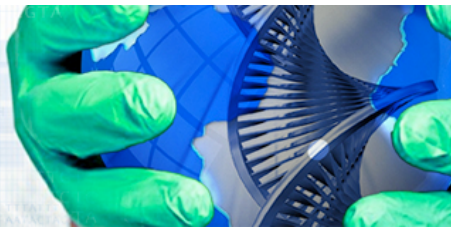


From Sept 11-15 2017, CSIRO co-hosted a conference "aimed at identifying synthetic biology solutions to conservation problems caused by environmental change. Experts from all fields of conservation came together to develop ambitious projects designed to alleviate the threat of an invasive species, further climate resilience, confer disease resistance, or develop stakeholder and community engagement." GBIRd associates involved in the event included Paul Thomas (Adelaide University), Karl Campbell (Island Conservation), Mark Tizard (CSIRO), Dan Tompkins (Landcare Research), Owain Edwards (CSIRO) and Andrew Sheppard (CSIRO).[26]

Ensuring a favorable regulatory environment

According to the FOI documents CSIRO ran a Gene Drive Workshop followed by a "Regulatory Meeting" in July 2016.[27] Owain Edwards also spoke on gene drive risks at the Australian College of Toxicology and Risk Assessment (ACTRA) Annual Meeting in Canberra at the end of September. This was noted as a "valuable opportunity to interact with regulators on the topic".[28]

Notably, Dr Mark Tizard from CSIRO is a member of GBIRd and is currently one of the four expert advisors on the Government's 2017 Gene Technology Scheme Review Expert Advisory Panel. This review is examining gene drives and other synthetic biology applications.[29] According to the Department of Health "his current interests are in gene editing in the cane toad and exploring the possibilities of the new gene drive technology for fish and rodent pests."[30] On 28th November 2017 he co-chaired the Department of Health's public engagement webinar on the Review of the Scheme.[31]

Hijacking UN processes

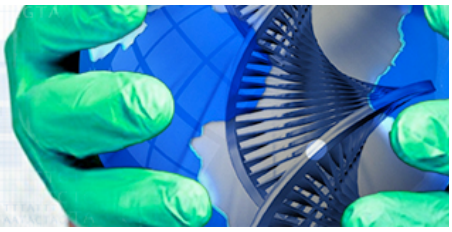
The FOI documents further reveal that a private agriculture and biotech PR firm (see separate briefing) was contracted by the Bill and Melinda Gates Foundation to build a covert 'advocacy coalition' in order to skew a current UN expert process addressing gene drives. Other documents show similar covert co-ordination of government representatives by an established biotech lobby group.

Members of Island Conservation briefed members of the GBIRd steering committee – including Peter Brown from CSIRO and Paul Thomas from the University of Adelaide and urged them to get themselves (and other's from their organisations/networks) nominated for the online forum. [32]

Mark Tizard from CSIRO was in contact with Royden Saah from Island Conservation during the forum[33] and argued against "stringent regulations" regarding gene drives.[34]

Does the CSIRO have a conflict of interest?

In the FOI documents Stephanie James from the Foundation for the National Institutes of Health raised concerns about CSIRO's potential conflicts of interest:



> *"As you know, Keith Hayes and his team are working with FNIH on a second risk assessment for Target Malaria and we have plans in the works for at least two more.*
>
> *Now that CSIRO is getting involved in its own efforts on gene drive, the question has arisen as to whether Keith's team can be perceived as independent while being part of an organization that is publicly advocating for the technology*
>
> *(http://www.abc.net.au/news/2017-06-13/should-invasive-pest-control-be-acceptable-to-the-public/8613070).*
>
> *There is some concern that this could become a lightning rod public perception issue.*[35]

Keith Hayes responded that "We have no vested interest in development or application of genetic control technologies", [36] despite him being formally involved in the GBIRd project.[37]

Dr Mark Tizard's is one of the four expert advisors on the Government's 2017 Gene Technology Scheme Review Expert Advisory Panel and is also advising Food Standards Australia New Zealand (FSANZ) on the regulation of new GM techniques. Dr Tizard recently publicly stated that people with serious conflicts of interest shouldn't be on government advisory committees.[38]

And yet he has serious potential conflicts of interest himself. Should the proponents of gene editing and gene drives really be advising on how - or even whether - these techniques should be regulated?

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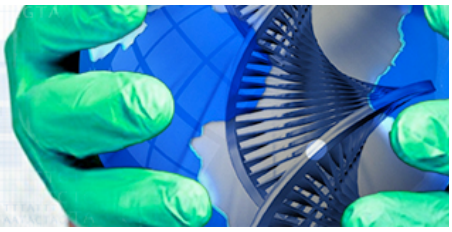
[1] FOI document: GBIRd MoU 2017 FINAL 20170419 .docx
[2] Keith Morris Woodvale Research, https://science.dpaw.wa.gov.au/people/?sid=85#projects
[3] FOI document: August 2017 Comprehensive GBIRd Update.docx
[4] FOI document: Attachment 5 Keystone Draft Consulting Agreement.pdf
[5] FOI document: August 2017 Comprehensive GBIRd Update.docx
[6] OGTR (2017) 2016-17 Technical Review of the Gene Technology Regulations 2001, http://ogtr.gov.au/internet/ogtr/publishing.nsf/Content/reviewregulations-1
[7] FOE (2017) *Government proposes deregulating dangerous new GM techniques*, http://emergingtech.foe.org.au/government-proposes-deregulating-dangerous-new-genetic-modification-techniques/
[8] The Department of Health (2017) Review of the National Gene Technology Scheme – Consultation approach 2017, http://health.gov.au/internet/main/publishing.nsf/Content/gene-technology-review
[9] FOI document: GBIRd MoU 2017 FINAL 20170419 .docx
[10] For reporting on the call for a moratorium on Gene Drives at CBD COP13 in Cancun December 2016 see http://www.etcgroup.org/content/160-global-groups-call-moratorium-new-genetic-extinction-technology-un-convention and https://www.scientificamerican.com/article/gene-drive-moratorium-shot-down-at-un-meeting/
[11] Zimmer, C. (2017) 'Gene Drives' Are Too Risky for Field Trials, Scientists Say, 16/11/17, https://www.nytimes.com/2017/11/16/science/gene-drives-crispr.html
[12] "Renee said the Safe Genes projects account for $65M, but then mentioned with all other support in the room it was $100M." FOI document: AS notes onDARPA safe genes rollout san diego may 2 2017
[13] It had already been publically disclosed that DARPA's Safe Genes Project had awarded $65 million - see https://www.nature.com/articles/d41586-017-01742-z
[14] The other known major investors in Gene Drives are The Bill And Melinda Gates Foundation in conjunction with the Federal National Institutes of Health (FNIH) who have invested $75 million into Target Malaria Consortium, Tata Trusts which made a $70 million donation to UC San Diego to establish a centre of research on gene drives and 'active genetics' , the Open Philanthropy Project which provided $17.5 million, to Project Malaria and just over $1.2 million to (FNIH) and The European Union which grants 1.5 million Euros to Target Marlaria researchers.
[15] FOI document: Trip Report AVPC 2017.pdf



[16] FOI document: 20170331-[gbird] GBIRd Priorities - March 2017-326 (N0024091xC1D49).PDF
[17] FOI documents: 20170512-Fwd_ Gene Drive Breakout group - Army Corps Workshop in May-390.pdf; 20170510-Syn Bio Workshop-Ticketing information (UNCLASSIFIED)-194.pdf
[18] FOI document: Attachment 5 Keystone Draft Consulting Agreement.pdf
[19] FOI document: August 2017 Comprehensive GBIRd Update.docx
[20] See for example: Barclay, P. (2017) Scientists fight to make invasive pest control palatable to the public, *Big Ideas*, 13/6/17 http://www.abc.net.au/news/2017-06-13/should-invasive-pest-control-be-acceptable-to-the-public/8613070; Barclay, P. (2017) New weapons in the battle against invasive pests, *Big Ideas*, 5/7/17, http://www.abc.net.au/radionational/programs/bigideas/new-weapons-in-the-battle-against-invasive-pests/8580602; Mitchell, N. (2017) Making happier animals? Gene editing on the farmyard, *Science Friction*, 18/11/17, http://www.abc.net.au/radionational/programs/sciencefriction/making-happier-animals-gene-editing-on-the-farmyard/9154208; Williams, R. (2017) Cane toads to get the Crispr treatment, The Science Show, 18/11/17, http://www.abc.net.au/radionational/programs/scienceshow/cane-toads-to-get-the-crispr-treatment/9161942
[21] Australian Academy of Science (2017) ***DISCUSSION PAPER: SYNTHETIC GENE DRIVES IN AUSTRALIA: IMPLICATIONS OF EMERGING TECHNOLOGIES***, https://www.science.org.au/files/userfiles/support/documents/gene-drives-discussion-paper-june2017.pdf ; For reporting on the call for a moratorium on Gene Drives at CBD COP13 in Cancun December 2016 see http://www.etcgroup.org/content/160-global-groups-call-moratorium-new-genetic-extinction-technology-un-convention and https://www.scientificamerican.com/article/gene-drive-moratorium-shot-down-at-un-meeting/
[22] FOI document: 20170331-[gbird] GBIRd Priorities - March 2017-326 (N0024091xC1D49).PDF
[23] FOI document: Trip Report AVPC 2017.pdf
[24] Dr Oliver Mayo – BioAngels, http://agfoodtech.com.au/uploads/Oliver%20Mayo.pdf
[25] Australian Academy of Science (2017) *DISCUSSION PAPER: SYNTHETIC GENE DRIVES IN AUSTRALIA: IMPLICATIONS OF EMERGING TECHNOLOGIES*, https://www.science.org.au/files/userfiles/support/documents/gene-drives-discussion-paper-june2017.pdf; SCIMEX (2017) NEWS BRIEFING: 'Evolution-bending' gene drives could conquer pests, but what are the risks?, https://www.scimex.org/newsfeed/news-briefing-gene-drives2
[26] https://reviverestore.org/resilience/
[27] FOI document: 20170412-Re_Fall 2017 GBIRd Meeting-411.pdf
[28] FOI document: August 2017 Comprehensive GBIRd Update.docx
[29] The Department of Health (2017) Review of the National Gene Technology Scheme – Consultation approach 2017, http://health.gov.au/internet/main/publishing.nsf/Content/gene-technology-review
[30] The Department of Health (2017) Biographies, http://health.gov.au/internet/main/publishing.nsf/Content/011C554B9847D6F0CA258169000FCBBE/$File/Attachment%20D_Biographies.pdf
[31] Department of Health (2017) Review of the National Gene Technology Scheme – Consultation approach 2017 http://www.health.gov.au/internet/main/publishing.nsf/Content/gene-technology-review
[32] FOI document: 20170418-Re_CBD online forum - edits to the proposed list of _volunteers_-322.pdf
[33] FOI document: 20170724-Forum-52.pdf
[34] Convention on Biological Diversity (2017) List of participants, http://bch.cbd.int/synbio/participants/; Comment #8492, http://bch.cbd.int/synbio/open-ended/discussion/?threadid=8365#8450
[35] FOI document: 20170717-consultation on an ethics question-722.pdf
[36] FOI document: 20170717-consultation on an ethics question-722.pdf
[37] FOI document: 20170331-[gbird] GBIRd Priorities - March 2017-326 (N0024091xC1D49).PDF
[38] ABC (2017) Making happier animals? Gene editing on the farmyard, *Science Friction*, 18/11/17, http://mpegmedia.abc.net.au/rn/podcast/2017/11/sfn_20171118.mp3 at 34.05 mins