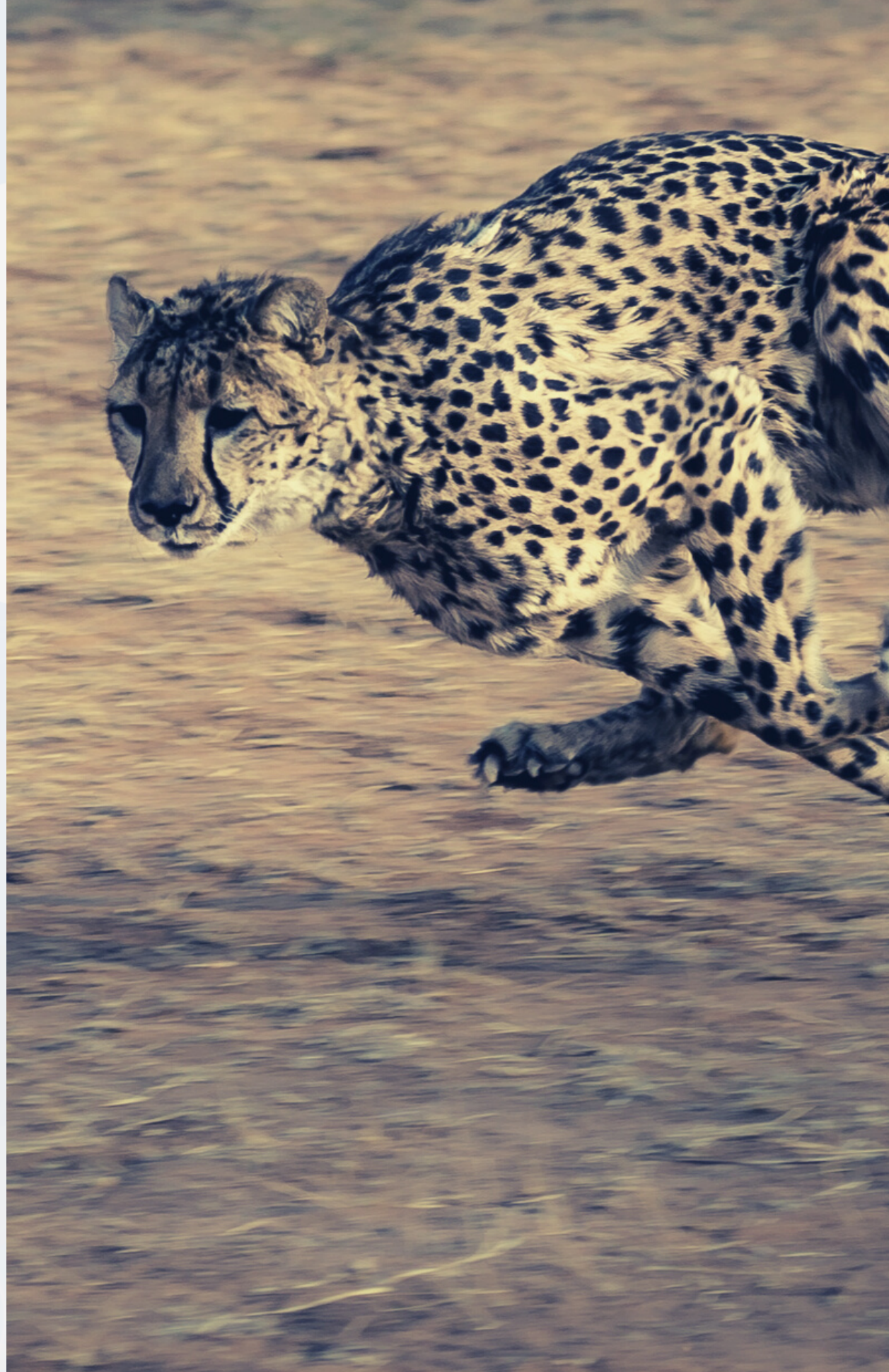DAVID PEARCE (2020)

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Reprogramming The Biosphere

Towards a Pain-free World

The exponential growth of computer power makes every cubic metre of the planet accessible to surveillance and micro-management.

Cross-species fertility regulation, AI, nanotech, robotics, "reprogramming" predators, CRISPR genome-editing and synthetic gene drives turn the level of suffering in the biosphere into an adjustable parameter.

David Pearce (2020)

QUESTION
What level of suffering in Nature is optimal?

David Pearce (2020)

"

Life preys upon life. This
is biology's most
fundamental fact.

MARTIN H. FISCHER

"

Big fleas have little fleas upon their backs to bite 'em, and little fleas have lesser fleas, and so, ad infinitum.

AUGUSTUS DE MORGAN, SIPHONAPTERA, (1872)

DARWINIAN LIFE

In nature I see, or seem to see, good and evil -- intelligence and ignorance -- goodness and cruelty -- care and carelessness -- economy and waste. I see means that do not accomplish the ends -- designs that seem to fail. To me it seems infinitely cruel for life to feed on life -- to create animals that devour others. The teeth and beaks, the claws and fangs, that tear and rend, fill me with horror. What can be more frightful than a world at war? Every leaf a battle-field -- every flower a Golgotha -- in every drop of water pursuit, capture and death. Under every piece of bark, life lying in wait for life. On every blade of grass, something that kills, - something that suffers.

ROBERT INGERSOLL

The total amount of suffering per year in the natural world is beyond all decent contemplation. During the minute that it takes me to compose this sentence, thousands of animals are being eaten alive, others are running for their lives, whimpering with fear, others are being slowly devoured from within by rasping parasites, thousands of all kinds are dying of starvation, thirst and disease. It must be so.

RICHARD DAWKINS, RIVER OUT OF EDEN (1995)

THE PROBLEM OF SUFFERING

HOW SERIOUS?

"I believe that most of us tend to underrate the evilness of suffering. The reason is that it is difficult for us, when not actually suffering, to recollect what suffering really is. We employ numerous psychological mechanisms to conceal from our consciousness the true nature or meaning of suffering, to falsify and deny it. We do this without renouncing the word, however. The word comes to designate, in our minds, only a faint copy or superficial image of the real thing; but having forgotten what the original is, we mistake it in the copy. We ascribe to "suffering" a certain gravity of evil; but it is slight compared to what we would ascribe to suffering itself, if we could only recall its true meaning..."

"Suffering and Moral Responsibility" (1999) by Jamie Mayerfeld

THE PROBLEM OF SUFFERING - 2

"The falsification of suffering is everywhere — in movies, in poetry, in novels, on the nightly news. Accounts of disaster routinely veer from a discussion of the agony and plight of the victims (which quickly becomes tiresome) to the description of some moving act of kindness or bravery. Often it is these descriptions that affect us the most and that provoke the greatest outburst of emotion. These are the images we often take away and that become our image of "suffering." Suffering comes to be closely associated with stirring images of hope in adversity, acts of moral heroism and touching kindness, gestures of human dignity, sentiments of noble sympathy and tremulous concern, the comfort and consolation of tears. It turns into something beautiful. It becomes poetry. People begin to refer to "sublime suffering." Suffering, in other words, becomes just exactly what it is not."

"Suffering and Moral Responsibility" (1999) by Jamie Mayerfeld

Four Different Long-Term Policy Options for the Biosphere:

1. "Pleistocene rewilding" - restoring much of the planet to its state before the human impact.

2. Conservation biology - preserving the status quo. More wildlife parks, minimal intervention, conservation with no regard to the subjective well-being of individual animals, just the abstract health of species and ecosystems, i.e. an extension of traditional conservation biology.

3. Compassionate biology - ultimately extending to all free-living sentients. Genome editing; cross-species fertility-regulation via immunocontraception and tunable gene drives; GPS-tracking and monitoring; genetic tweaking and/or cultured meat for obligate carnivores; a pan-species welfare state in tomorrow's Nature reserves: "high-tech Jainism".

4. Phasing out free-living non-human sentients altogether.
"Why improve Nature when destroying it is so much easier?" by Robert Wiblin (2011)

Compassionate Biology I

What is the most ethical way to achieve ecologically sustainable population sizes in human and non-human animals?

(1) Starvation, predation, parasitism and disease?
or
(2) Cross-species fertility-regulation?

Tools of cross-species fertility-regulation range from family planning in humans to immunocontraception in large terrestrial vertebrates to CRISPR-based synthetic gene drives for small fast-breeders. The CRISPR system can be used as a programmable genome-editor offering a high level of control over the genomes of all living species. Nuclease-based synthetic gene drives permit the super-Mendelian spread of any desired genetic element through any sexually reproducing species of free-living organism. Thus male/female sex ratios can be biased to reduce or amplify population sizes. Programmable, tunable drive systems of varying efficiencies can be used remotely to regulate population sizes of billions of sentient beings. Population sizes - and levels of suffering - throughout the living world will soon be adjustable parameters.

Compassionate Biology II

Nociception is vital, pain is optional.
Gene Case Study 1: the SCN9A gene (the "volume knob for pain")
SCN9A encodes a voltage-gated sodium channel (subunit Nav1.7) Dozens of alleles

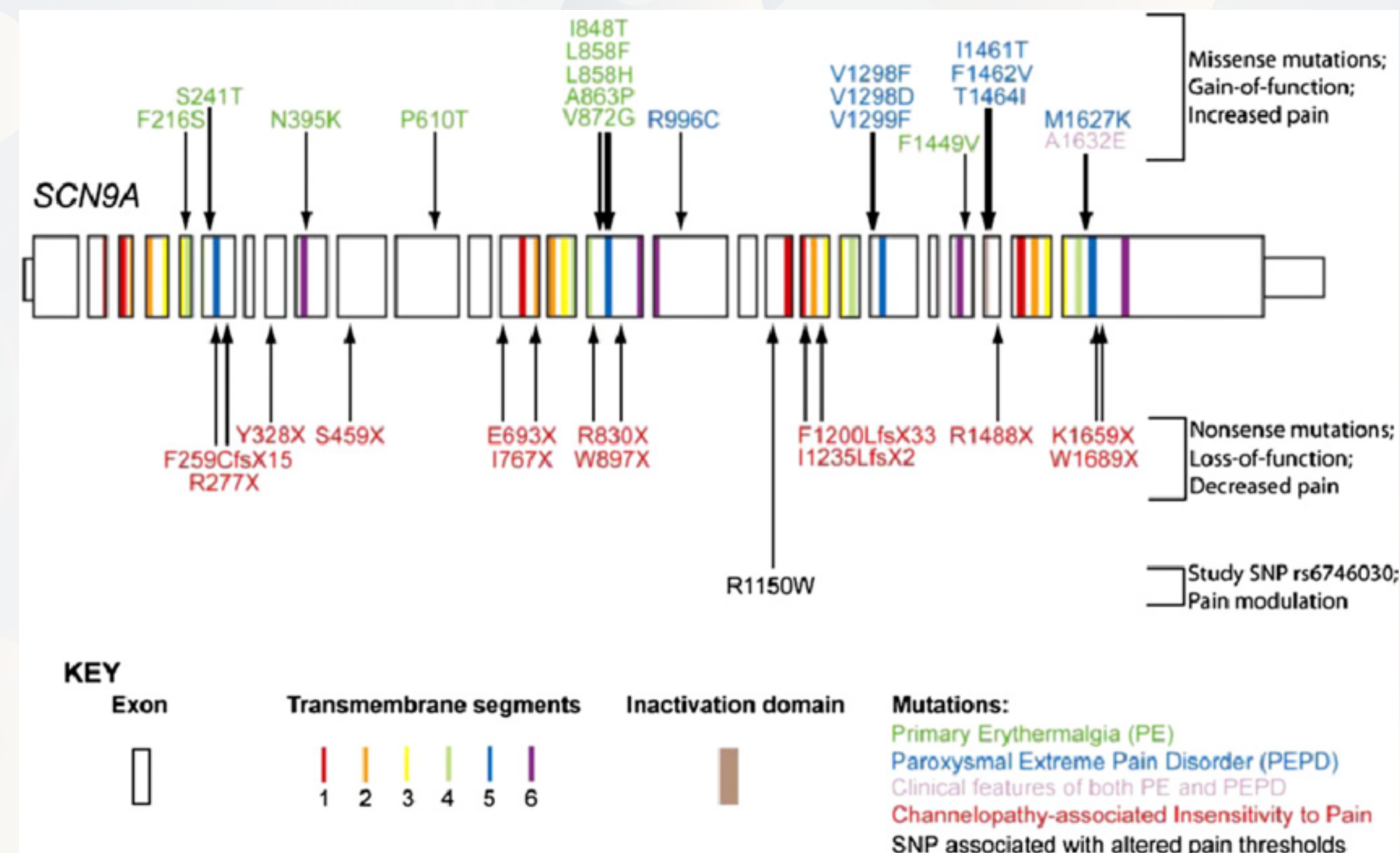Nonsense mutations abolish the capacity to experience pain.

Benign alleles induce abnormally high pain-tolerance ("But pain is just a useful signalling mechanism!")

Malign alleles induce abnormally high pain-sensitivity e.g paroxysmal extreme pain disorder and erythromelalgia ("man on fire" syndrome)

"End Pain Forever. How a Single Gene Could Become a Volume Knob for Human Suffering"
https://www.wired.com/2017/04/the-cure-for-pain/

Compassionate Biology II

Pain perception is altered by a nucleotide polymorphism in SCN9A – Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Schematic-of-the-SCN9A-gene-showing-the-position-of-known-mutations-arrows-that-result_fig1_41825516 [accessed 26 Feb, 2020]

Compassionate Biology III

What about emotional pain? What about anxiety? What about default hedonic tone and hedonic set-points? How can we engineer life based on *information-sensitive* gradients of well-being?

Gene Case Study 2. Which alleles of the FAAH and FAAH-OUT gene are optimal?

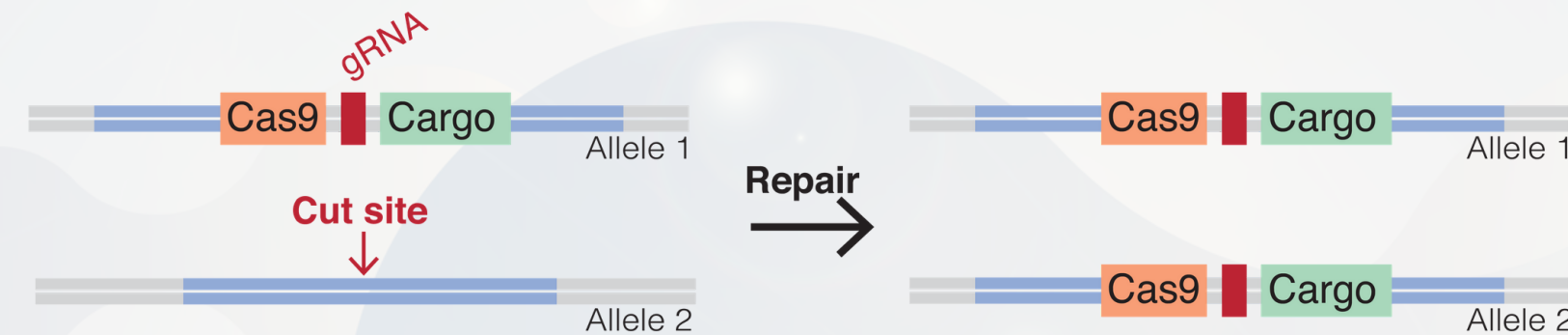Benign alleles elevate levels of anandamide (from the Sanskrit for "bliss")

Risks: "Only the paranoid survive"

Complications: the omnigenic model: Yong, Ed (2017-06-16). "What If (Almost) Every Gene Affects (Almost) Everything?". The Atlantic. Boyle, Evan A.; Li, Yang I.; Pritchard, Jonathan K. (June 2017). "An Expanded View of Complex Traits: From Polygenic to Omnigenic". Cell. 169 (7): 1177–1186. doi:10.1016/j.cell.2017.05.038. PMC 5536862. PMID 28622505.
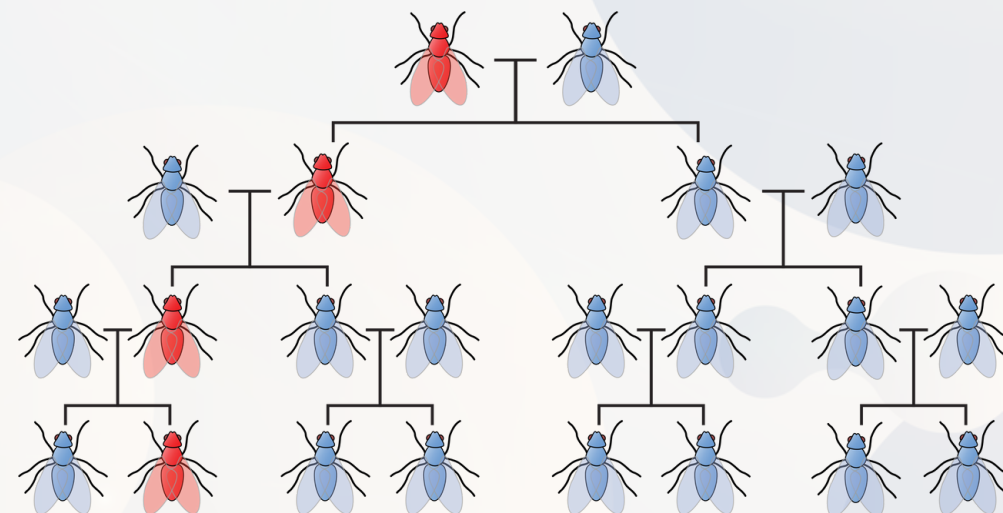
Creating Post-Darwinian Life – https://www.hedweb.com/social-media/postdarwinian.pdf
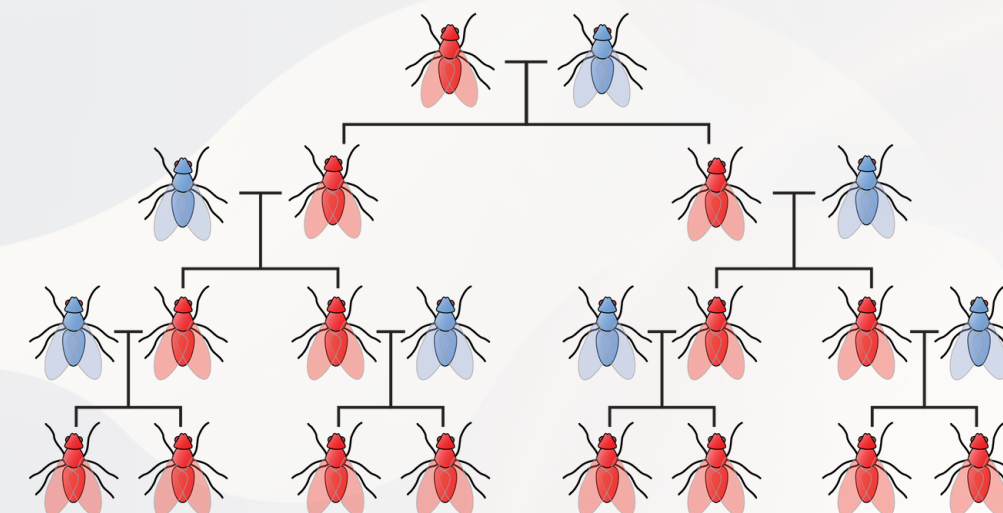
Compassionate Biology IV

gRNA

| Cas9 | | Cargo | Allele 1 |

Cut site

Repair →

| Cas9 | | Cargo | Allele 1 |
| Cas9 | | Cargo | Allele 2 |
Allele 2

Normal inheritance

Gene drive inheritance

Altered gene does not spread

Altered gene is always inherited

Mariuswalter – CC BY-SA 4.0

Genetically Designing a Happy Biosphere (2016, 2020)

Compassionate Biology IV

Gene Drives defy the "laws" of Mendelian inheritance A synthetic gene drive is a gene-editing technology that propagates a particular suite of genes throughout an entire species or population. A gene drives alters the probability that a specific allele will be transmitted to offspring from the natural 50% probability.

OPTION: Fix the pain-sensitivity (etc) of members of entire free-living species by propagating benign alleles of SCN9A or its homologs via gene drives, i.e. engineering via CRISPR-mediated gene-editing not a (currently utopian) "no pain" biosphere, but a "low pain" biosphere.

Compassionate Biology V

What about Slow Breeders?

A Welfare State For Elephants

Compassionate Biology V

WHAT ABOUT OBLIGATE PREDATORS?

Retirement, Dietary Reform (cultured meat) or Genetic Tweaking?

"Predator Free 2050" is a New Zealand government program to phase out mammalian predator species. Announced in 2016 by New Zealand's prime minister John Key.

"Daughterless predators" will be created using gene drives
https://en.wikipedia.org/wiki/Predator_Free_2050

https://www.reprogramming-predators.com/

OBJECTIONS 1

The "No True Lion" Argument

Species Essentialism

Is a lion who stops asphyxiating and disembowelling zebras "truly" a lion?

Response: Are humans who start wearing clothes and stop eating meat "truly" human? If we lose some of our "species essence", does it matter?

OBJECTIONS 2

The Zoo Argument

"Compassionate stewardship would turn the rest of the living world into a zoo!"

Response: Human and non-human animals flourish best when free-living – neither incarcerated nor "wild".

OBJECTIONS 3

"Hubris!"

Veganising the living world has technical and ethical pitfalls.

BUT today's uncontrolled habitat-destruction is more ecologically hazardous than compassionate stewardship.

Vital: exhaustive risk-benefit analysis, computer modelling, and pilot studies in self-contained mini-biospheres.

OBJECTIONS 4

Religious Opposition

"But the Bible says..."

Response:
"The wolf will live with the lamb,
and the leopard will lie down with the goat;
the calf and young lion and fatling will be together,
and a little child will lead them.
The cow will graze with the bear,
their young will lie down together,
and the lion will eat straw like the ox".
(Isaiah 11-6-7)

What would a "All-Merciful", "All-Compassionate" God / Allah / Simulator (etc) want intelligent moral agents to do?

TIMESCALES

A Hundred-Year Plan is technically feasible.

A Thousand-Year Plan may be more sociologically realistic.

A Pan-Species Welfare State?

Towards the well-being of all sentience
HEALTH: "A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (1948 WHO definition of health)

POST-DARWNIAN LIFE

"May all that have life be delivered from suffering." - Gautama Buddha

Genetically Designing a Happy Biosphere (2016, 2020)

THE END

DAVID PEARCE (2020)

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