This is an experiment in which we are juxtaposing interspecies encounters with biomedicine, reproduction, environment and precarious lives in the UK with those in Brazil. Our long term goal is to collaborate on a comparative project – this is just a very rough beginning. We aim in this paper to draw on and extend anthropological and theoretical work on reproduction and the environment to offer a critical perspective on public health. Here we juxtapose ethnographic examples – from Friese & Latimer's study of an epigenetics department in a prestigious UK Life Sciences Institute and the Fiocruz Social Science Zika Network's encounters with mosquitoes, scientists and women in Brazil.

Our aim is to extend our work on interspecies occupational health (Friese & Latimer 2019) and offer a position paper on rethinking approaches to how '(re)production' (re)produces precarious environments and to possibilities of caring interventions built on taking a social, transdisciplinary and interspecies perspective.

We juxtapose ethnographic research in a UK epigenetics lab with research in Brazilian public health around the Zika arbovirus. Our focus were the backgrounded practices and materialities and lived realities in the making and unmaking of knowledge. This involved what Maria Puig de la Bellacasa denotes as a speculative commitment to

neglected things; such as seeing how our actants (scientists, animal carers, the animals themselves) are involved in reproduction – of science and society as well as the generation of progeny.

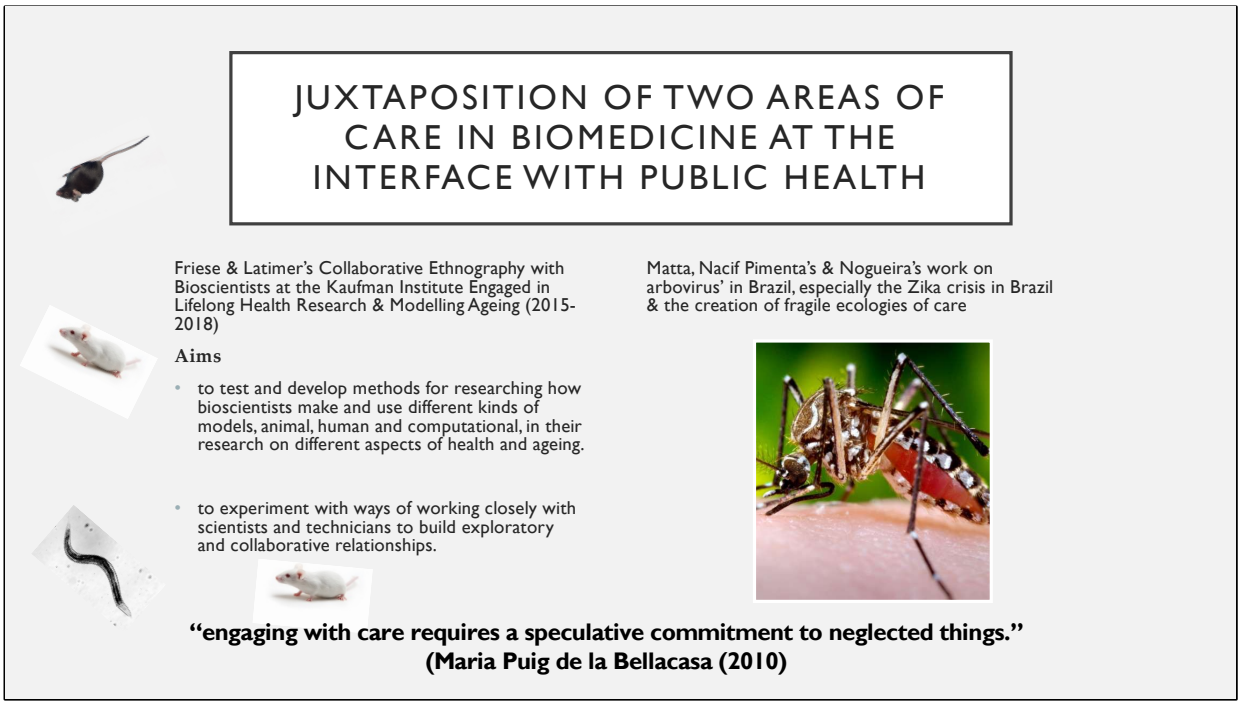
In the paper we begin by describing how reproduction, environment and precarity are enacted in the epigenetic laboratory. We go on to present how Brazilian public health concerned with the Zika crisis enacts reproduction, environment and precarity and then think through my encounters with the Zika Social Science network, including scientists, and community health workers, to point to how there may be a movement towards an interspecies and collective public health which takes into account knowing the mosquito as animal and even gathers the mosquito into the fold of humanitarian approaches to vector control.

We draw together together Anna Tsing's theory of unscalability with Marilyn Strathern's doubling of the notion of conception, as both sexual reproduction and the making of knowledge to support a symbiopolitical critique.

Reproduction – as an analytic concept - aims to highlight the extent to which and the manner whereby production relies upon and yet makes invisible the unpaid labour involved in reproducing species. Also it aims to illuminate whose reproduction is facilitated and even mandated – and whose reproduction is discouraged and even stopped – recreating intersecting social hierarchies along the lines of class, race/ethnicity, nationality, sexuality, and age.

Meanwhile, the environment – as an analytic concept – aims to highlight the extent to which and the manner whereby our understandings of genetics have often required repressing the constitutive role of the environment.

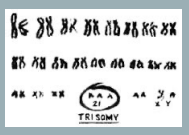
The idea of genes as deterministic in twentieth century molecular biology, culminating with the Human Genome Project, attempted to rule out as secondary the ways in which physical and social configurations beyond the individual body shape how genes get expressed and, in turn, how the body and its parts come into being over time and through development across the life course. However, the Human Genome Project rather ironically troubled the reductionisms upon which it was based, and created enabling conditions for an increasing number of geneticists to consider the constitutive role of the 'environment' through particularly epigenetic



In what follows we focus on two ways of thinking with symbiopolitical entanglements. The first is drawn from our ethnographic study of a UK Life Science Institute that focussed on how epigenetic scientists are remodelling lifelong health and ageing. This work focussed on sciences' intimate entanglements with animals bred and used as experimental models. The second is from work with the Zika Social Science Network at Fiocruz in Brazil. With Eva Giraud and her colleagues (2019) this work focuses on the intimate entanglements of human communities and more 'awkward' (Ginn, Beisel, & Barua, 2014) species – so-called pests, parasites and pathogens – that have become abundant. We explore how this abundance of awkward species does not offer a site of hope for navigating the 'ruins' of scalability and capitalism as Anna Tsing (2015) does. Specifically, exploration of awkward species intimate entanglements with particular human communities helps show how "the affordances of abundant lifeforms, including the dangers they pose to other forms of life, are entwined with failed 'technofixes', colonial legacies and contemporary inequalities." (Giraud et al 2019).

THE FEMALE PREGNANT BODY IMAGINED AS ENVIRONMENT & AS *VECTOR*

The reproducing body in the experiment often referred to as female, and even as the 'mother' e.g. yeast cells



The 'mother' enacted both as her offspring's 'environment' (e.g. how does the 'age' of the mother affect the eggs, the placenta and so on, and how do these things affect the growth and development of their offspring?)

&

as what *transmits* the 'external environment' enabling it to act on the next generation

Problematic given the increasing pressure on women as responsible as individuals for the health of the next generation – often presented as matters of 'lifestyle choice'

Biological Question: How does the mother's 'inheritance' & 'her environment' affect non-genetic variability in the offspring?

Sociological Question: How is the 'mother' 'situated' – historically, socially, culturally, politically?

In the epigenetics laboratory experimental subjects (mice, yeasts, nematodes) are feminised and much experimental work depends upon their reproduction as stable and invariant entities, with any variability controlled by the experiment. In the interests of scalability and the reproduction of a way to scientific knowledge, the environment is enacted as natural forces with the social reproduction of precarity and many aspects of the chaos of life made invisible as components of the experiment that have affects and effects.

The difficulty is that the pregnant body gets reproduced as if gene-environment interactions are affected by natural forces or by lifestyle choice: and yet both the socio-material life of both the animal and the scientists – the vectors of knowledge – are constantly enriched and manipulated by the experiment and by the institution (including life sciences institute and as well as the institution of science) as always potential sites of precarity – the precarity perhaps of experimental failure, and of being able to reproduce the conditions of an exacting science.

In our study of epigenetics how the reproductive body is enacted in the laboratory experiments aligns with how the pregnant body is enacted in contemporary public health discourse. Specifically we are concerned with how 'reproductive environments' (e.g., eggs, sperm, embryos, uterus, placenta, the maternal body, and 'external' environments) in the laboratory are defined and acted upon in the 'postgenomic moment' (Richardson and Stevens 2015). Here we have an interest in how epigenetics is (or is not) transforming the ways in which 'the environment' and 'reproduction' are known in the lab and how does this compare to the ways that 'the environment' and 'reproduction' are experienced by women at "life's precarious edges" (Svendsen et al 2017)

In our pilot study we found that, while social and health inequalities are recognized as urgent societal challenges, the social is not represented in experiments. Rather gene-environment interaction, as the material basis for social differentiation and behaviour, is researched in terms of 'natural variables' in the reproductive environment rather than 'social' forces (Niewöhner 2011). For example, in our pilot study epigenetic experiments conceive of environmental stress as 'diet' or 'heat' - that is, as forces that induce biological effects including stress - and enable scientists to observe effects on gene expression and heredity (Friese and Latimer 2018). Heat and diet as features of the environment are not thought about as 'social', for example in terms of how their specificity and distribution in natural time and space is the effect of socio-political forces, including inequalities. These findings thus point to room for both refinement and expansion of scientists' categories which are still amenable to experiment, or at the very least to how their research is interpreted.

We also found, with Skinner (2017), that ffemale reproduction is often central to the ways epigenetic research is conducted. The animals used in experiments were almost always denoted as female - mice, nematodes, even yeast, are feminized - yeast cells for example are called 'mothers' and their offspring 'daughters'. The maternal body of the animal is also itself constituted as a critical aspect of 'reproductive environments', either in terms of 'eggs' or as the conduit for external environmental stressors, such as diet. This focus is of importance because of how women are responsibilized as individuals, who, with 'the right knowledge', can make 'lifestyle' and 'reproductive choices' to support the health of the maternal body and thereby that of their offspring (Müller and Kenny 2017, Lupton 2012). In contrast to the life sciences, for social scientists female reproduction needs to be situated in complex social, political and cultural environments to disrupt, rather than reinforce, the responsibilization of women for the health of future generations. The difficulty though is that introducing the 'chaos of life' (ref) into the lab disrupts the reproduction of the laboratory environment and the scalablity of the knowledge being produced (see also Steven Rose *Lifelines).*

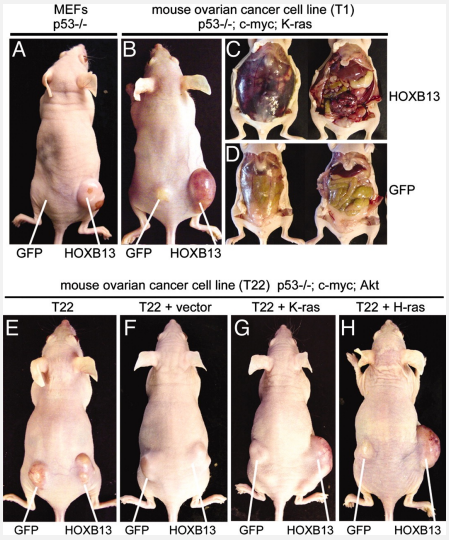
The figure of the reproducing body is enacted then as both female and as, in experiments, a kind of vector'. 'Precarity' is enacted as how the environment can effect gene penetration and expression of the reproducing body and how this biological activity does or does not effect the reproducing body itself as well as the growth and form of its offspring and its future health. In the laboratory environment's are made stressful, and biologically precarious, through experiments that intervene by manipulating different elemental or 'natural' forces. It is these effects that are scalable - what is neglected and invisibilized are the unscalable aspects of experimental world-making, including taking the perspective of the animal

as vectors of knowledge.

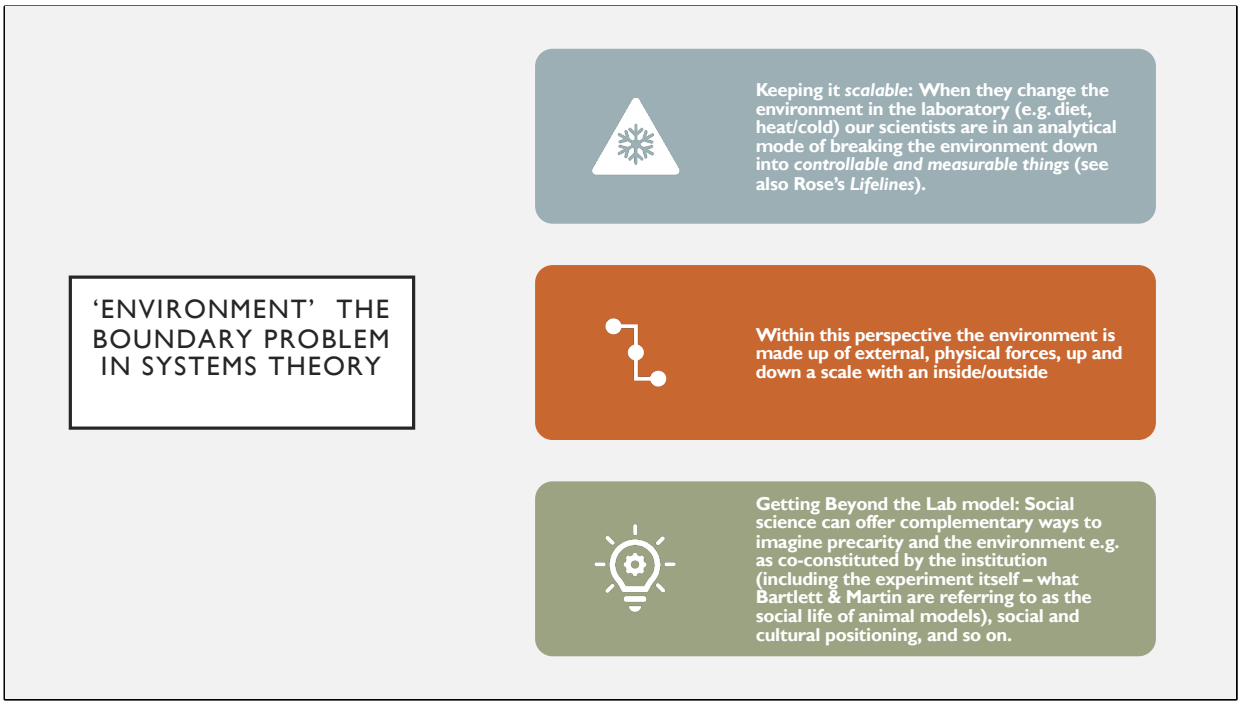
(UN)SCALABILITY & PRECARIOUS REPRODUCTIVE ENVIRONMENTS

cancer in developed mice aged as models of the ageing immune system but *who are not* an animal model for ovarian or liver cancer

the mice are still vaccinated and killed for their lymph nodes, and their genes



For example in Carrie's observations in the facility where the mice models are cared for she found that the process of preparing them for experiments affected their reproductive health – for example preparing them as models of the ageing immune system they developed ovarian and liver cancers. But these aspects of their health were not taken into account by scientists – on the contrary the mice where still used in experimentation despite their carers brining the problem to the vet in charges attention. So the environment in which the mice were cared for created health problems that were unscalable and invisibilized, specifically they did not prove scalable enough to eliminate them as vectors of knowledge.



Tsing notes that while economy and ecology cannot be reduced to one another, wealth has historically been accumulated by alienating humans and nonhumans from their "entanglements of living" so as to stand as resources for investment (Tsing 2015: 5). Laboratory animals must be alienated from their entanglements of living so as to be standardized. Indeed, this is why they need to live healthy, stress-free, stimulated lives under similar cage conditions. The point here is to ask what elements of animal lives, as they move from being living creatures in the animal house to dead bodies and body parts in the lab, get attached and detached. Sex differences in communal living is a nonscalable part of animal modelling in the case above. What happens to that which is non-scalable? It becomes part of natural history or it is made into material for another science: laboratory animal science. As Tsing (pp 42) notes, it would be a mistake to assume that scalability is bad and nonscalability is good but rather that to use nonscability theory to understand modelling practices in science. Our goals are not normative but rather descriptive.

We now turn to my work in Brazil, and from the social life of animal models to the social life the aedes aegypti mosquito as possible vector of knowledge that is moving towards a scalable interspecies and even symbiopolitical public health science.

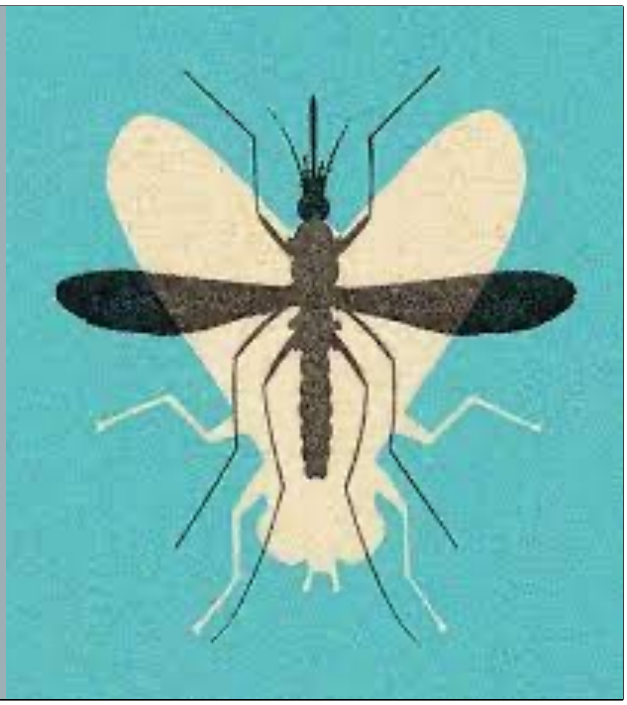
"I behold you stand
For a second enspasmed in oblivion,
Obscenely ecstasied
Sucking live blood
My blood.

Such silence, such suspended
transport,
Such gorging,
Such obscenity of trespass.

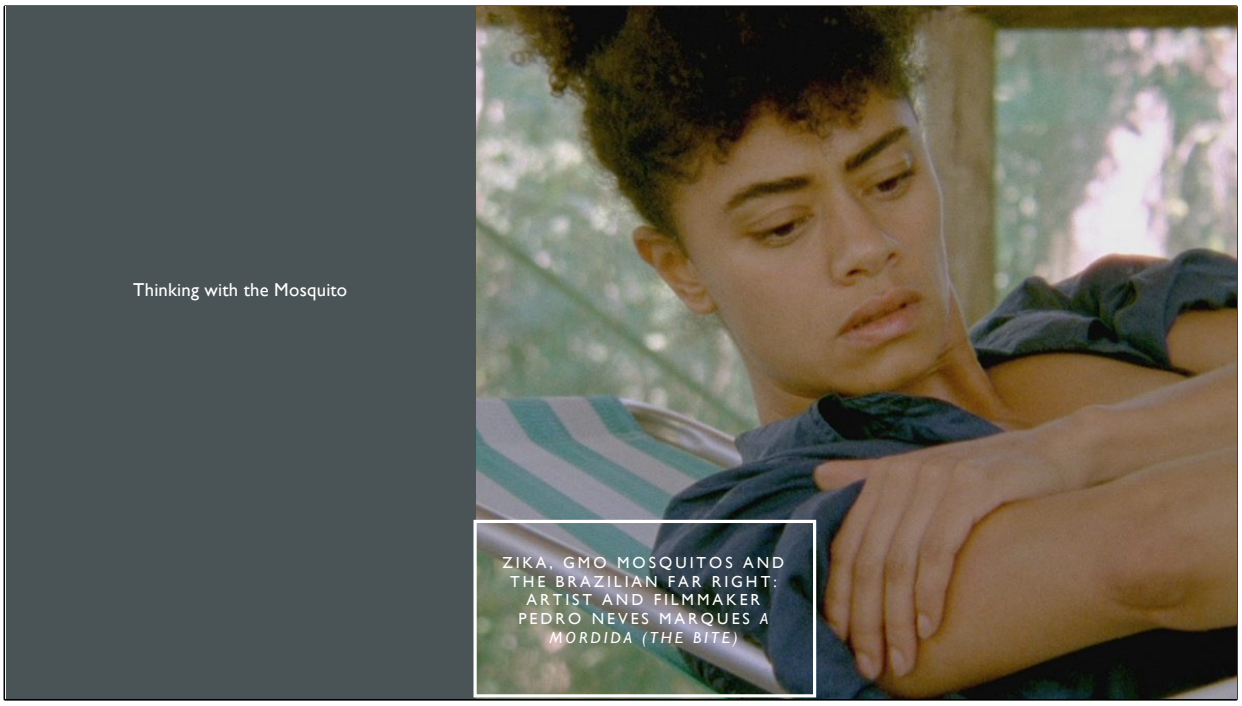
You stagger
As well as you may.
Only your accursed hairy frailty
Your own imponderable
weightlessness

Saves you, wafts you away on the very
draught my anger makes in its
snatching."

(DH Lawrence (1923) The Mosquito, in D. H. Lawrence, Birds, Beasts and Flowers: Poems, London: Martin Secker: 89-92.)



My first encounter with serious mosquitoes was in Venice in around 1963. I was 9 years, camping with my family by the then very polluted lido. It was humid and very hot and I got badly bitten with my bites becoming infected and extremely painful and swollen. In his poem The Mosquito the British author DH Lawrence refers to how when he was in 'sluggish' Venice he had heard a woman call the mosquito the Winged Victory. His poem (slide) as you can see from this extract uses violent and extreme imagery, words like 'hate' and 'obscenity'. For Lawrence being at war with 'nature' is problematic, but he asks 'am I not mosquito enough to out-mosquito you?' getting help from nature because of how the mosquito cant help 'trumpets' its presence. Thus Lawrence thinks with the particularities of the mosquito to work out how to do just that – out-mosquito the insect - ending the poem having won his fight with the winged victory – swatting it into a 'dim dark smudge'.
(DH Lawrence (1923) The Mosquito, in D. H. Lawrence, Birds, Beasts and Flowers: Poems, London: Martin Secker: 89-92.)



I went to Brazil armed with the most powerful mosquito repellents I could get hold of and checked out all vaccinations I needed - I was fearful. Because within Brazilian campaigns and public reporting the Zika mosquito was targeted as the enemy. Casting mosquitoes as villains is ubiquitous. Casting Mosquitoes as Lopes and Castro-Reis' (2019) epidemic villains is both political and powerful, because as Pedro Neves Marques amongst others has argued it masks the everyday realities of not just living with mosquitoes but of the conditions of possibility through which mosquito, human and pathogenic relations emerge.

It also masks a way to shift perspective – casting the mosquito as villain and vector neglects to think with care about the mosquito as animal.

VIVIAN CACCURI

ARTIST AND COMPOSER
MAY 2022

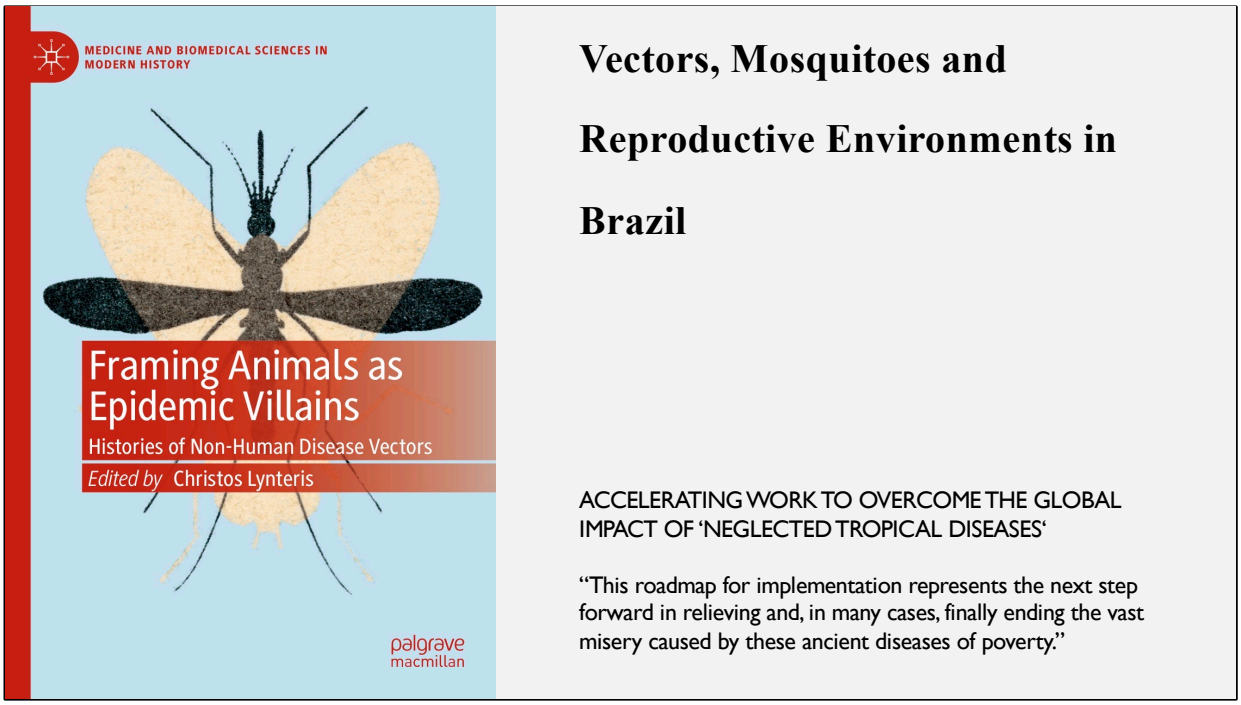
"So you see, the interspecies issue in Rio de Janeiro is not a choice, or an aesthetic desire. It is our tangible reality, part of our everyday life and the further North you go in Brazil, the more intense this interspecies reality is. And this is how temperature defines life in the Tropics: while the North has the challenge of having to manage the cold and the ice, we, the South, have the challenge of controlling an unstoppable movement of living beings into our residential or work environments: mold, cockroaches, monkeys, bacteria, ants, moths, flour moths, bats, termites, possums, weevils, geckos, spiders and many, many mosquitoes. It seems that these animals are here to remind us that a perfectly sterile urban environment will never be possible in the South. Who needs that anyways?"

https://studiumgenerale.artez.nl/nl/studies/blog/power+the+body+and+a+mosquito+swarm/

Ningiukulu Teevee *Untitled* (detail) (n.d.) COURTESY MADRONA GALLERY REPRODUCED WITH PERMISSION DORSET FINE ARTS

Here, with Vivian Caccuri I want to stress how in the face of the Mozzie all our contemporary talk of worlds in common with nonhuman others, of symbiopolitics, of compost and the chtulicene, and of neglected species such as nematodes as 'wormy collaborators', the mosquito is felt as and represented as deeply problematic figure – as the world's most prolific killer - figured an enemy of humans, a vector of diseases that make humans very sick.

And yet in my encounters with Brazilian scientists I found that they are thinking with the mosquito as animal to unpack how thinking with the mosquito, just as thinking with animal models in the laboratory, can help reconfigure the human-environment relations that tend to underpin science and public health imaginaries, and reconceptualise reproductive environments as interconnected time-space multiples, or using Tsing's language as "living-space entanglements" including diseases as complex co-constructions.



Typically representations of environment, precarity and reproduction are enacted in work on arbovirus', especially in the Zika epidemic to figure mosquitoes as epidemic villains. The direction of transmission of flavivirus' such as Zika, Dengue and Yellow Fever are classically represented as from the vector (e.g. the female mosquito) to the human.

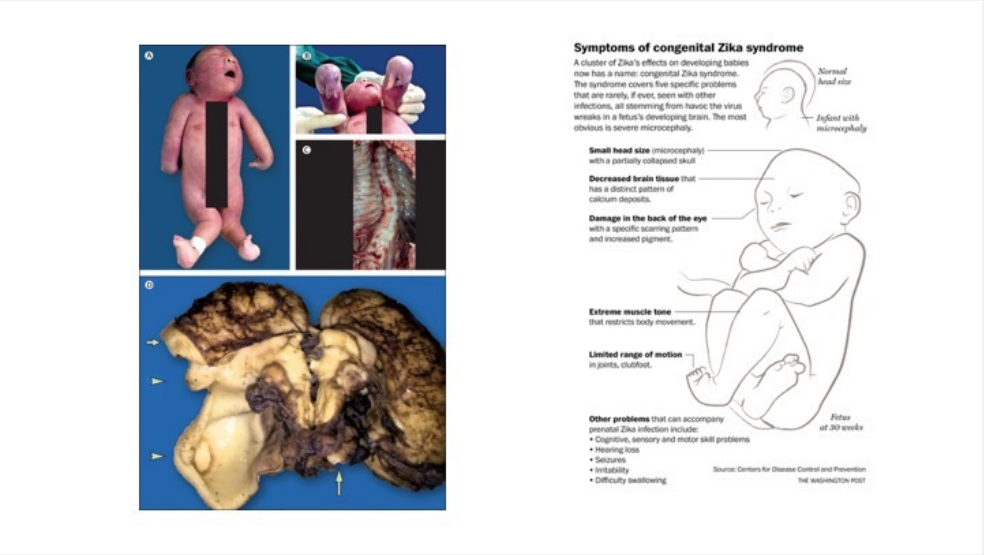
Both the female insect and human body are represented as vectors of human pathogens.

Specifically As in our study of animal models in the epigenetics laboratory it is reproduction and the female body that become highlighted as critical to the reproduction of the virus.

The 'shock' of Zika in Brazil was twofold: a) that Zika transmitted mosquito-to-human but also human-to-human (saliva, and sexual fluids - STD) threatening Brazil's tourist industry as *the* party destination and as hosting the Olympics; b) it passes *through* the infected pregnant mother (who becomes vector 2) to the growing foetus to cause problems in growth and form – especially neurological to produce a new clinical classification: Congenital Zika Syndrome.

Brazil, particular Recife in the N.E region was being constructed as "the heart of the epidemic" – with Zika represented as a disease of reproductive environments co-produced by poverty, racial inequity and geopolitical effects e.g. https://www.washingtonpost.com/graphics/world/zika/?tid=lk_inline_manual_6, WHO Warnings in papers in the Lancet stress that human activities are spreading

vector-borne diseases because “rapid changes in land use, trade globalization, and "social upheaval" are causing a resurgence in zoonotic disease across the world (Wikipaedia – rewrite and check - https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(18)30203-1/fulltext).

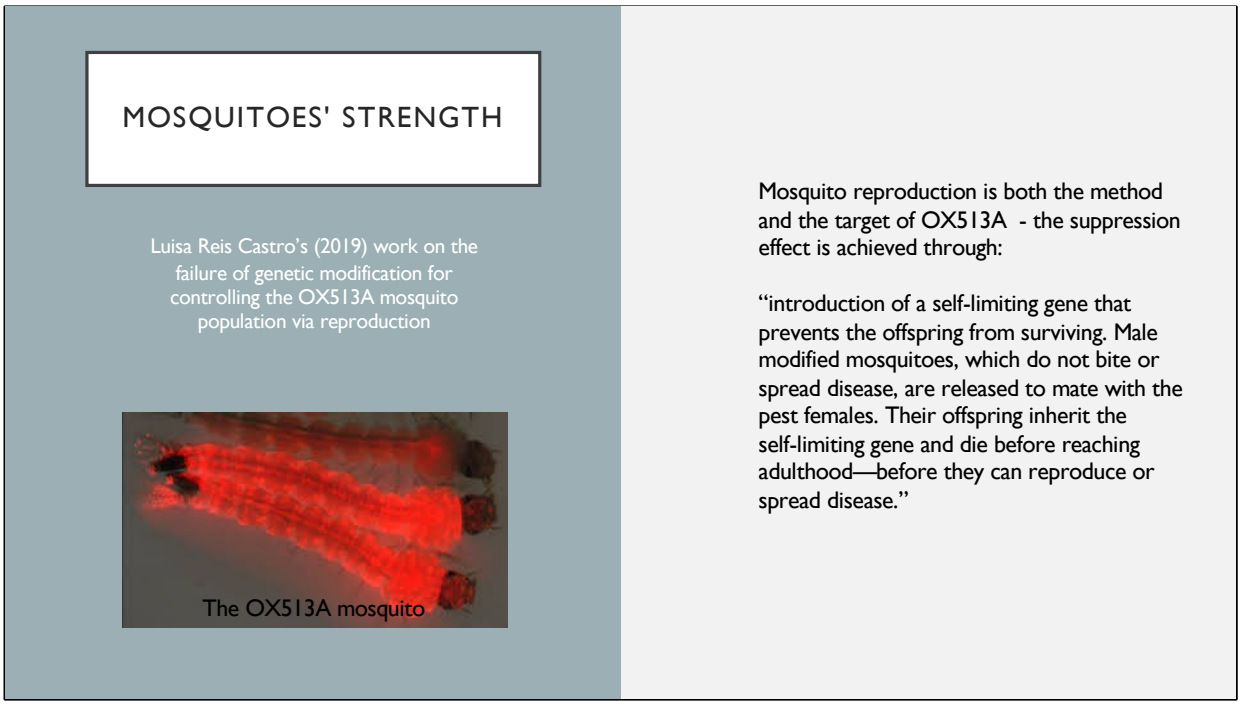


The [birth defects caused by Zika]have been described detail as the virus has spread to more than 45 countries, infecting hundreds of thousands of people, including tens of thousands of pregnant women. Now researchers have concluded that a Zika infection during pregnancy is linked to a distinct pattern of birth defects that they are officially calling Congenital Zika syndrome." (Washington Post 2016)

The epidemic in Brazil was framed as a war – a war of both people against mosquito and women against microcephaly. Ribeiro et al. (2018: 138) pointed out that the Brazilian state "played a fundamental role in defining the terms of the debate" through a "war frame" that was focused on individualised disease prevention, particularly placed on women. This war spectacle masked social and gender inequalities, extending the negligence of poverty and regional inequality." (Matta et al (2019).

In the public health campaigns as Reis Castro and Nogueira (forthcoming) suggest the dual centrality of mosquitoes and CZS targeted bodies (human and mosquito) that can gestate in order to institute vector control. For example, during the epidemic, women were told they should avoid pregnancies and protect themselves from insect bites. By analysing the conceptualization of the Zika virus transmission, they examine the political and epistemological effects of this framework and the historical, social, and environmental conditions that turned the Zika epidemic into a matter of women and of mosquitoes.
As Matta et al (2019) suggest

"The epidemic in Brazil was framed as a war – a war of both people against mosquito and women against microcephaly. Ribeiro et al. (2018: 138) pointed out that the Brazilian state "played a fundamental role in defining the terms of the debate" through a "war frame" that was focused on individualised disease prevention, particularly placed on women. This war spectacle masked social and gender inequalities, extending the negligence of poverty and regional inequality." (Matta et al (2019).



In these imaginaries as at the same time as the female is responsibilized the image of the mosquito as *the enemy* (Matta, Nogueira and Silva 2019) is intensified. The mosquito is also constituted as what Denise Nacif Pimenta (personal communication) describes as the weakest link: to refer back to Lawrence's poem the mosquito as vector is a winged victory.

The 'weakest link' perspective legitimates strategies to control and destroy the mosquito - for example chemical control by spraying and genetic modification techniques that work to change how the mosquito reproduces. There are several problems here.

First, The mosquito's strength has been illustrated over and over again. For example, in Luisa Reis Castro's (2019) work on the failure of the OX513A mosquito aimed at control not by chemical but by genetic modification. Mosquito reproduction is both the method and the target of OX513A - the suppression effect is achieved through

“introduction of a self-limiting gene that prevents the offspring from surviving. Male modified mosquitoes, which do not bite or spread disease, are released to mate with the pest females. Their offspring inherit the self-limiting gene and die before reaching adulthood—before they can reproduce or spread disease.” Mosquitoes were released in one region of Brazil (including asking populations to let themselves be bitten by the mosquitoes) – it failed because the genes of the modified mosquitoes had, in fact, mixed with the natural population. And while the population in the area had decreased significantly after the release of the modified specimens by summer of 2019 numbers had rebounded almost to their previous levels” (https://www.nature.com/articles/s41598-019-49660-6%7C Transgenic *Aedes aegypti* Transfer Genes into a Natural Population

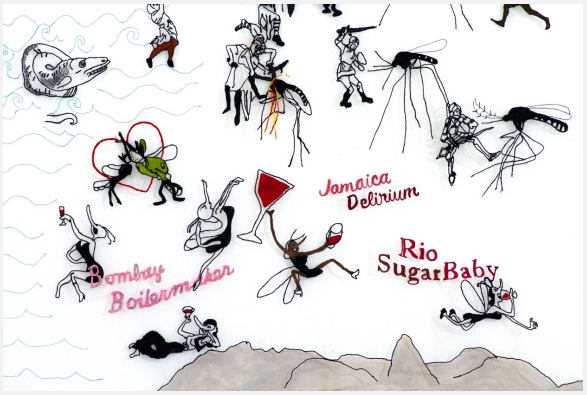
Nacif Pimenta and Valle’s transdisciplinary research (cf. **) on flaviviruses like Dengue, Yellow Fever and Zika suggests that actually mosquitoes are not the weakest link , rather that they are too strong for the ‘laboratory model’.

As Valle a Brazilian Bioscientist who worked on Dengue put it to Joanna in an interview in Fiocruz in 2019, the more her lab developed chemical control sprays to control larvae and adult mosquitoes the more they developed resistance – it seemed, she said, that she was ‘trying to dry ice’ because the mosquito is ‘adaptable to humans’. She said that she realised that she was not changing ‘the reality’ of Dengue, so she ‘detached’ from the laboratory she had ‘created’.

The second, is that this objectification fails to think with the mosquito as animal.

"When I hear the sound of machines and realize that we reject their noise in the same fashion as we reject a mosquito's one (by not recognizing their "natural" beauty and classical standards of balance), it never fails to amaze me that we, as humans, deny the mosquitoes' animality while putting them in a place where we feel entitled to act sadistically; killing them just for fun while feeling awesome as we do it. As humans, we have a similar sadistic impulse when we laugh at the humiliation of bad singers and musicians. Don't be fooled: I'm not a pro-life mosquito activist; I'd kill one as quickly as you would, but the contribution of artists towards trivial or unwanted subjects might perhaps help us not to spend unnecessary and unpragmatic time with them but instead lure the public to observations that are not as superficial as everyday-life's ones. Some souls will be moved and shook; some will have new sensations; some will leave exactly as they arrived in the exhibition room." Vivian Caccuri, May 2022

https://studiumgenerale.artez.nl/nl/studies/blog/power+the+body+and+a+mosquito+swarm/



Power, the body and a mosquito swarm

How I ended up making art about the most hated insect in the world.

The Sound of the Mosquito

To return to the composer Caccuri's : there seems in the focus on the mosquito and female bodies as vectors through which flaviviruses reproduce to be a failure to be alongside the specificities of mosquitoes' animality. Caccuri brings mosquitoes into the fold by composing music based on their own music – a mosquitoes soundscape – the very same that Lawrence in his poem describes as its "small, high hateful bugle".

In her interview Valle also describes paying more attention to the mosquito: she seems to hint at the new imaginaries that are developing and which suggest a more complex, ecology of care which grows from an understanding of the yellow fever viruses' as intimate interspecies relations in entangled environments.

For example, Valle suggests that you have to start with understanding epidemics as co-created and that you have to know the mosquito and look at the environment from the perspective of the mosquito. Knowing the specific mosquito means knowing that aedes aegypti are "humans best friends", because they are domestic, inhabiting not forests or the wild, but urban spaces and the home; that they, like humans, like water and shade; that they are like humans, opportunistic - do not just come out in the day or the night, at dusk or dawn, but at the same time as humans, because humans are their source of blood; you also have to know they have a seven day breeding cycle. Moreover, you have to look 'from the perspective of the mosquito' – a gaze which 'thinks mosquito' – looking for shady, watery places where they breed – the condensation trays inside the air conditioning, the rainwater butt on the roof, the saucers under pot plants to catch the water, the cat and dog water bowl, the flower vase; and you have to clean each of the spaces where mosquitoes love to dwell, every 7 days, and cover all sources of water! Valle worked with community public health agents, media and education programs on the concept of 'cleaning' to control Dengue – a "concept not a campaign" – 'knock-knock' can I come in – they are authorised to go into the house – survey it for breeding sites, and educate people how to see like a mosquito and institute a 7 day cycle cleaning program in which all members of the household are assimilated. Problems arise here and we need to know how this campaign reassembled the social, including creating occasions for

cleaning, and the extent to which this reproduced a different kind of gender and economic asymmetries. The difficult is moreover, that cleaning is is also a complex co-construction. Cleaning and aedes aegypti reproduction both require water, so access to clean water and good drainage make controlling mosquito reproduction not just an individuated public health matter but also a socio-political interspecies public health matter: water itself may need to be gathered into the fold as a member in fragile ecologies of care.

Another scientist, Marcos Freire, illuminated a shift towards care for the animal. His intimate entanglements with yellow fever involved an intimate entanglement with more-than-human worlds to invert the usual perspective of arbovirus science. He stressed the need to understand the eco-social underpinnings of epidemics (see also Possas et al 2018) and to focus on arbovirus' as more than epizootic - in the case of yellow fever, his own specialism, this includes taking care of the monkeys who get sick from yellow fever. He emphasised that while the monkeys may provide animal models for research there is a need to develop a vaccine for them not just to stop the spread of yellow fever to look after humans, but to look after the monkeys and help the monkeys to not get sick.

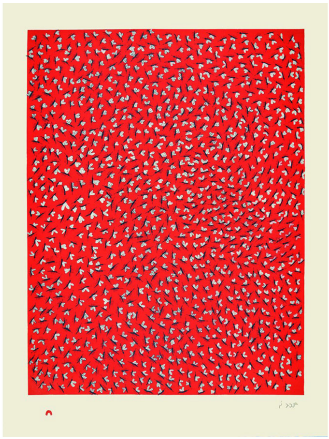
Valle in her interview also suggested that you have to know how contagion works – she for example how in Zika 2 out of 10 people infected by Zika get sick, so it spreads wider because people don't know they are infected. She also stressed thinking with the mosquito not just as a vector, but as a body that can be infected by the body of a human – where the human becomes the vector - so that you have to encourage people, even those who are already infected by the virus to wear repellents to protect the mosquito from becoming infected. While this thinking inverts the usual direction of how the virus is transmitted it is still aimed at control of the mosquito as vector in order to protect humans.

We want to suggest that these inversions represent fragile ecologies of care that disturb and trouble the laboratory science model, but which are also aspects of the unscalable.

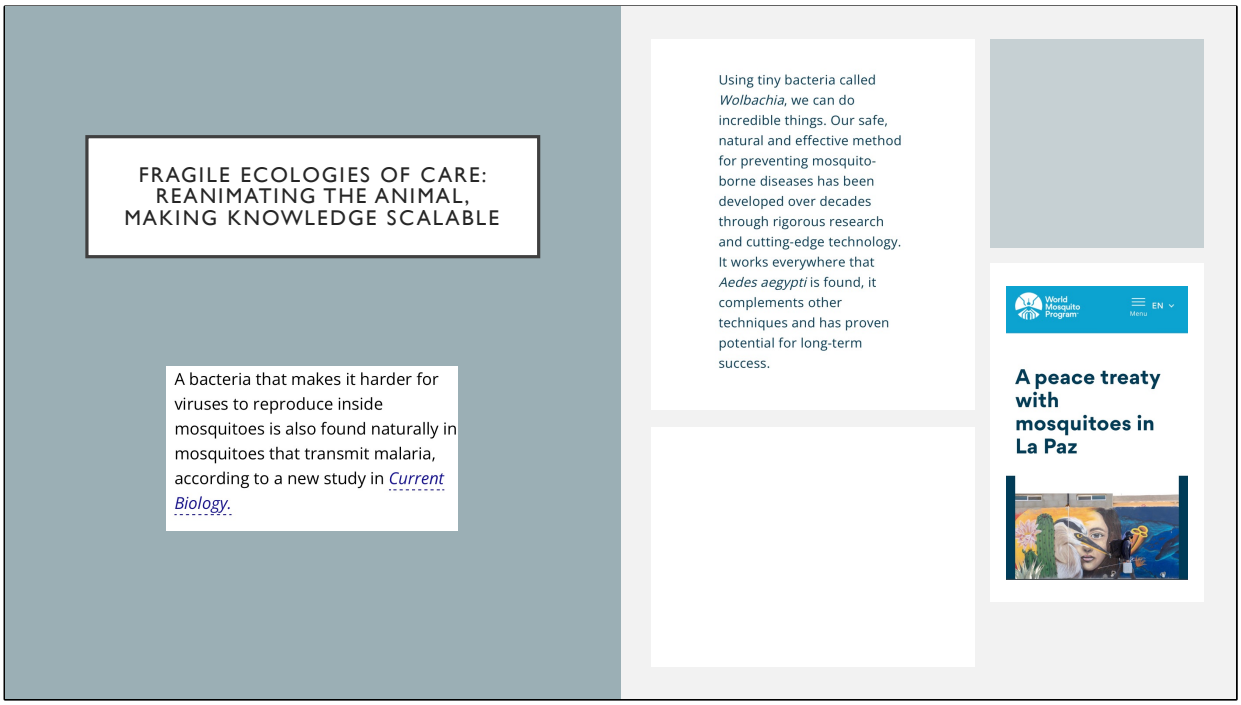
THINKING WITH CARE WITH AWKWARD & ABUNDANT SPECIES:

SCALABLE?

Giraud et al's (2019) focus on abundance in the Anthropocene and intimate entanglements between human communities and 'awkward' species e.g. the Aedes Aegypti mosquito, water and the poor



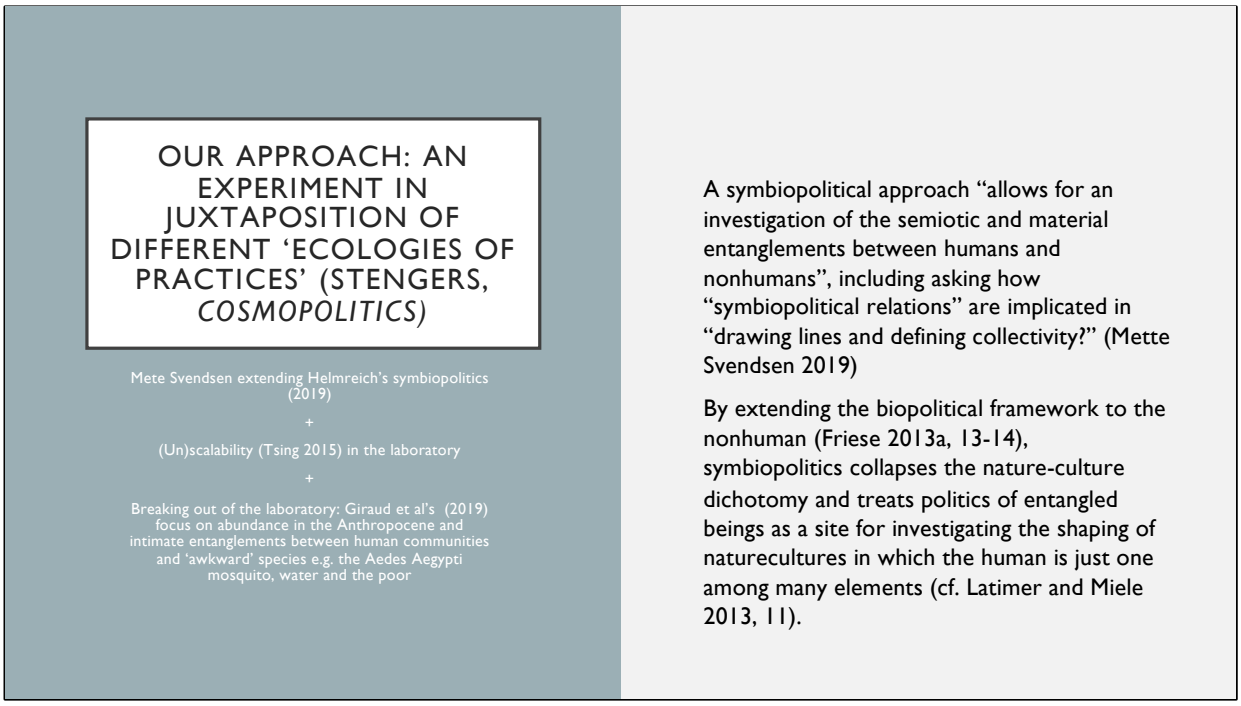
More recent research at LSHTM and by the World Mosquito Program seems to incorporate a shift towards a more interspecies and collective approach, but one that is scalable – research is needed on these programs that help illuminate what is getting lost. These programs emphasise that flaviviruses start with humans and infect mosquitoes. And that research to control arboviruses has to think with about, for and with the mosquito. The research takes advantage of shifts in scale: from genomic and micro analyses of the mosquito microbiome afforded by contemporary genomic technologies to the scaling up afforded by the shear abundance of mosquitoes.



I have not yet done any research inside these programs and can only go on what is being made public ally available. The claim is that these programs conjoin bioscientists knowledge of the mosquito as animal with public health and affected communities. No individual human or animal is responsibilized – the villains are the viruses themselves not the vectors. They seem to exploit several aspects of reproductive genomic knowledge and of mosquito existence: that mosquitoes such as aedes aegypti carry Wolbachia and that this bacteria makes it hard for viruses like zika to reproduce inside the mosquito. Second they know that female mosquitoes that carry Wolbachia can pass it on to their offspring; third that female aedes aegypti need human to reproduce; and fourth that the bacteria do not harm the females.

What the experiment needs is humans to allow themselves to be bitten in order to proliferate aedes aegypti who can eliminate the virus (this is the tricky part – convincing those communities who for so long have been killing and repelling mosquitoes!). Participating communities all in affected areas globally release swarms of aedes aegypti.

Questions arise as to whether or not there hidden aspects of these experiments that are like those in Carrie and my study highlighting the unscalable affects and effects of of preparing ageing mouse models of the ageing human immune systems. But for now the programs seem to offer us an interspecies, collective approach that as at the same time it is directed at reproduction turns the female aedes aegypti from epidemic villain into epidemic hero.



In conclusion

We have begun to describe and compare how reproduction, environment and precarity are enacted in the epigenetic laboratory and in Brazilian public health concerned with the Zika crisis. Here we drew together Anna Tsing's theory of unscalability with Marilyn Strathern's doubling of the notion of conception, as both sexual reproduction and the making of knowledge, to explore their symbiopolitics. In the epigenetics laboratory experimental subjects are feminised and much experimental work depends upon their reproduction as stable and invariant entities, with any variability controlled by the experiment. In the interests of scalability and the reproduction of a way to scientific knowledge, the environment is enacted as natural forces with the social reproduction of precarity and many aspects of the chaos of life made invisible as components of the experiment that have affects and effects. The difficulty is that the pregnant body gets reproduced as if gene-environment interactions are affected by natural forces or by lifestyle choice: and yet both the socio-material life of both the animal and the scientists – the vectors of knowledge – are constantly enriched and manipulated by the experiment and by the institution (including KI as well as science) as always potential sites of precarity – the precarity perhaps of experimental failure, and of being able to reproduce the conditions of an exacting science.

In juxtaposing different forms of symbiopolitics we have suggested how Brazilian ideas shift the notion of 'public' away from the dominance of its individuating biopolitics to rethink global health from the perspective of a critical 'collective health' (Matta, Pimenta, Nogueira) that includes not just the geopolitics of reproductive

environments but the importance of thinking-with more-than-human as well as transdisciplinary intimate entanglements. Specifically, we have speculated how thinking with transdisciplinary and interspecies Others helps biomedicine break out of the laboratory model in ways which help create new and fragile ecologies of care. Specifically, these transdisciplinary and interspecies ecologies of care do not just work on the precarious reproductive environments created by the mosquito-human relations in the making and unmaking of disease, but also represent precarious reproductive environments because they are concerned with producing critical public health knowledge which is not scalable in biomedicine's usual terms.

We want to suggest that these inversions represent fragile ecologies of care that disturb and trouble the laboratory science model, but which are also aspects of the unscalable.

Drawing on Stefan Helmreich's concept of "symbiopolitics" Mette Svendsen (2019) suggests an approach that "allows for an investigation of the semiotic and material entanglements between humans and nonhumans", including asking how "symbiopolitical relations" are implicated in "drawing lines and defining collectivity?" She argues that by extending the biopolitical framework to the nonhuman (Friese 2013a, 13-14), symbiopolitics collapses the nature-culture dichotomy and treats politics of entangled beings as a site for investigating the shaping of naturecultures in which the human is just one among many elements (cf. Latimer and Miele 2013, 11).