

# OPEN SOURCE ESTROGEN

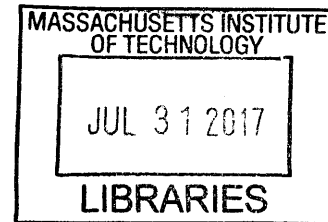
From biomolecules to biopolitics...  
Hormones with institutional biopower!

Mary Tsang

B.S.A. Biological Sciences And Art  
Carnegie Mellon University, 2013

Submitted to the Program In Media Arts and Sciences, School of  
Architecture and Planning in partial fulfillment of the  
requirements for the degree of Master of Science in Media Arts  
and Sciences at the Massachusetts Institute of Technology.

June 2017  
©MIT. All rights reserved.



ARCHIVES

Signature redacted

Signature of author **Mary Tsang**  
May 6th, 2017

Signature redacted

Certified by **Hiromi Ozaki**  
Assistant Professor of Media Arts and Sciences  
Program in Media Arts and Sciences

Signature redacted

Accepted by **Pattie Maes**  
Academic Head  
Program in Media Arts and Sciences

# OPEN SOURCE ESTROGEN

From biomolecules to biopolitics...  
Hormones with institutional biopower!

Mary Tsang

Submitted to the Program In Media Arts and Sciences, School of Architecture and Planning in partial fulfillment of the requirements for the degree of Master of Science in Media Arts and Sciences at the Massachusetts Institute of Technology.

June 2017  
©MIT. All rights reserved.

## Abstract

A collaborative, interdisciplinary research project, *Open Source Estrogen* combines biohacking and speculative design to demonstrate the entrenched ways in which estrogen is a biomolecule with institutional biopower. It is a form of biotechnical civil disobedience, seeking to subvert dominant biopolitical agents of hormonal management, knowledge production, and anthropogenic toxicity. The project begins with a speculative question: what if it was possible to make estrogen in the kitchen? From this seed arises more fundamental questions about who is producing hormones, whose bodies are affected, and how environmental hormones exist already as a state of toxicity. While issues of body and gender sovereignty are deeply at stake, endocrine disruptors termed 'xenoestrogens' pervade our environments due to petrochemical agro-industrial and pharmaceutical forces. These xeno-molecules change the morphology of our bodies and bodies of non-human species, evidencing a malleability inherent to nature but alien to our prescribed notions of (eco)heteronormalcy. In response to the "molecular queering" performed by estrogen, facilitated by dominant hegemonic forces, the project initiates a public dialogue through DIY/DIWO (do-it-yourself/do-it-with-others) biohacking and artistic intervention. Using speculative design, iterative workshopping, and kitchen performance, *Open Source Estrogen* employs these tactics to create new subjectivities for living in an increasingly queer world. From capitalist xeno-forces arise xeno-solidarities, capable of collectively hacking the systems of hormonal colonization.

Thesis Supervisor: Hiromi Ozaki  
Assistant Professor of Media Arts & Sciences

# OPEN SOURCE ESTROGEN

From biomolecules to biopolitics...  
Hormones with institutional biopower!

MARY TSANG

Signature redacted

---

**David S. Kong**  
Research Scientist  
MIT Media lab

# OPEN SOURCE ESTROGEN

From biomolecules to biopolitics...

Hormones with institutional biopower!

Mary Tsang

Signature redacted

---

**Heather Dewey-Hagborg**

Assistant Professor of Art and Technology Studies

School of the Art Institute of Chicago

# TABLE OF CONTENTS

INTRODUCTION	6
The Hormonal Production of the Body	6
Molecules of Disruption	8
The Future is Queer	10
PRECEDENTS	13
Biotechnical Civil Disobedience	13
Techno-Feminism and Biotechnology	15
APPROACH	17
The Role of Speculative Design	17
Initial Scientific Approaches	20
PART I: ESTROFEM! LAB	23
Estrogen Geeking and Freak Science	23
YES-HER Yeast Biosensors: does it say yes to her?	24
DIY Column Chromatography Urine Extraction Action	27
River Gynecology Xeno Waters S-P-Extraction	29
Estrofem! Workshopology Surveys	31
PART II: HOUSEWIVES MAKING DRUGS	36
Kitchen-Laboratory Subversion	36
Pre-production and Script Writing	38
Filming and Post-production	41
Public Exhibitions	44
PART III: HORMONE MICRO PERFORMANCE	45
Micro Performativity of Sex Hormones (2016)	45
Molecular Queering Agency (2016)	48
The Aliens in Green: Xenopolitics #1 (2017)	51
Conclusion	54
Acknowledgements	55
Appendix 1: YES-HER Protocol	56
Appendix 2: Urine-Hormone Extraction Workshop Protocol	57
Appendix 3: Estrofem! Workshop Survey	61
Appendix 4: Estrozine 1.1	63
Appendix 5: Housewives Making Drugs Show Script	77
Appendix 6: Stickers	<b>81</b>

# INTRODUCTION

## The Hormonal Production of the Body

How is gender codified by hormones? How did we arrive at the black-boxed fact that estrogen hormones would produce a female body, and that testosterone, a male body? Today's dominant institutions perpetuate a binary-sex system that excludes a diversity of bodies and ways of being. Validated by scientific fields of authority such as biology, embryology, and endocrinology, hormones are touted as the biological determinant of sexual identities. It is widely accepted that gender is chemical, that "sex hormones" such as estrogen, progesterone, and testosterone, are responsible for the production of primary sex characteristics in the developing fetus, then of secondary sex characteristics at the onset of puberty<sup>1</sup>. However, the way we research and define 'male' and 'female' comes already entangled with our gender biases.

Philosopher Ian Hacking writes in *Representing and Intervening*<sup>2</sup>, "We did not just find sex hormones somewhere in a lost corner, like a desert island lost in the mist. We ourselves called sex hormones into existence". This theory of mind is particularly helpful when looking at how bodies and truths about bodies are produced through the research of hormones in the laboratory or clinical setting. Similarly, feminist theorist Karen Barad and her concept of agential realism<sup>3</sup> describes that when we make observations in the laboratory, we make "cuts" through the deeply entangled web of intra-actions between everything, skewing what we see and what we leave behind as hidden. Hormones were first defined in 1905 by a British professor of physiology named Ernest Starling<sup>4</sup>, who described them as chemical messengers that are produced in the organ and then circulated through the body via the bloodstream. At this time the concept of "organotherapy" was a popular school of thought where organs contained the essence of the chemical messengers which they produced. Testicles were thought to contain the essence of manhood because they produced testosterone, and the origin of femininity, once thought to be the uterus, shifted to the ovaries as the producer of estrogen. During this time there was no way to see the chemical structure of hormones, so their detection and isolation depended on observing their physiological effects (but even in these observations, researchers were looking for a stereotypical traits of masculinity and femininity). Although both gonads (ovaries and testes) produce both hormones, scientists deliberately sourced hormones from their codified gender assignments. The hormones are literally "sexed," given sexes of their own. Scientists like Brown-Sequard and Eugen

---

<sup>1</sup> Fausto-Sterling, Anne. *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York, NY: Basic, 2000.

<sup>2</sup> Hacking, Ian. *Representing and Intervening: Introductory Topics in the Philosophy of Natural Science*. Cambridge: Cambridge U, 1992.

<sup>3</sup> Barad, Karen (2000), "Reconceiving scientific literacy as agential literacy, or learning how to intra-act responsibly within the world", in *Doing science + culture*, New York: Routledge, pp. 221–258.

<sup>4</sup> Ostertag, Bob. *Sex Science Self: A Social History of Estrogen, Testosterone, and Identity*. Amherst: U of Massachusetts, 2016.

Steinach went on to make great claims of hormonally produced gender fictions: that ingesting animal testes “rejuvenated” men of old age, that homosexuality could be cured with testosterone, that male mice feminized into docile subjects when their testes were replaced by ovaries.

To further understand how these somatic fictions became entrenched and normalized, we must “follow the funding” and discuss the actors who stood to gain and benefit financially from these stringent sex determinisms, and talk about the hormonal capital that is produced for the (un)gendered bodies for whom they are prescribed to. Author of *Testo Junkie*<sup>5</sup> Preciado writes, “the category *depression* does not exist without the synthetic molecule of serotonin, the same way that clinical masculinity does not exist without synthetic testosterone.” For every cause, there comes a cure. The 1930s marks the time of a “hormone race” between several European pharma-industrial companies. The “male hormone” testosterone was the first to be conquered, starting with numerous testicular transplant experiments on animals, then followed by its extraction from the urine of Berliner policemen and prisoners, resulting in its eventual chemical synthesis. For the “female hormone” estrogen, urine was also a primary source, recruiting pregnant women from gynecological clinics before switching to industrialized pregnant horses (the origin of Premarin, a predominant synthetic estrogen product in the mid-1900s). In these conquests was a roundabout cycle of identifying, measuring, making, and marketing of sex hormones, a deeply entangled triad of the laboratory, the pharmaceutical industry, and the clinic.

By the 1930s, scientists struggled to find a form of estrogen that produced enough visible effects to be marketed as a product. It wasn’t until they found synthetic molecules like bisphenol-A (BPA) and diethylstilbestrol<sup>6</sup> (DES) had had far superior estrogenic effects that they began prescribing them for a number of gender-normifying reasons: postmenopausal women, women who were too masculine, women who wanted to prevent miscarriage. This continued between 1930s to 1960s until estrogen therapy was developed as a contraceptive pill. The arena of reproduction is another politicized space of hormonal management and lucrative pharma-capitalism. Depending on the body, class, and country one is born into, the oral contraceptive pill on one hand is marketed as liberating a woman from reproductive burden, and on the other hand operates as a tool for mass population control. Today, synthetic estrogen and progesterone produced by way of plant sterol extraction continue to be the most highly manufactured pharmaceutical synthetic substances in the world.

But what about the bodies in between? An “unruly body” (“herms,” “ferms,” and intersex<sup>7</sup>) existing outside this sex-deterministic system is often treated as a disobedient object that must be disciplined through hormonal control. From the medicalization of bodies born of ambiguous genitalia, to the discrimination of trans-bodies by the pharmaceutical industry, to the disqualification of female

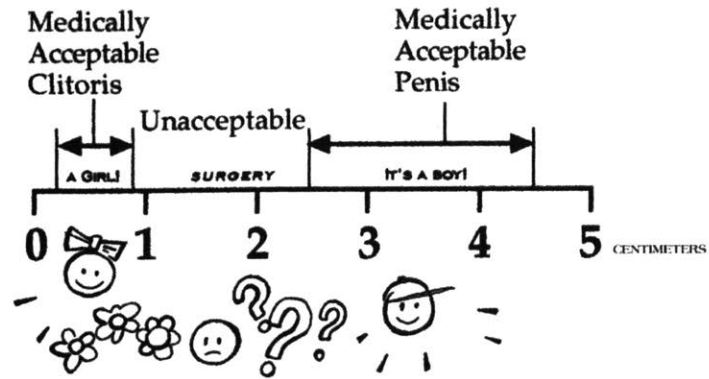
---

<sup>5</sup> Preciado, Paul B. *Testo Junkie: Sex, Drugs, and Biopolitics in the Pharmacopornographic Era*. New York, NY: Feminist at the City U of New York, 2013.

<sup>6</sup> Langston Nancy. *Toxic bodies: Hormone disruptors and the legacy of DES*. New Haven, CT: Yale University Press, 2010.

<sup>7</sup> Fausto-Sterling, Anne. “THE FIVE SEXES.” *The Sciences*. Blackwell Publishing Ltd, 31 July 2013. Web.

intersex athletes from competitions based on above average testosterone levels<sup>8</sup> (a direct example of bio-surveillance); these are all ways that bodies are disciplined and punished through a politically and economically sanctioned heteronormative agenda.



## Phall-O-Metrics

FIGURE 3.4: Phall-o-Metrics. The ruler numbers indicate centimeters (not to scale). (Source: Alyce Santoro, for the author)

Image from in Anne Fausto-Sterling's *Sexing the Body* (2000).

Now, these heavy critiques on hormonal production of the body aren't to dismiss the fact that whole gender and sexual revolutions have been incited in the last century for access to these hormones. The women's liberation front in the 1950s, or "second wave feminism" was dedicated to fighting for access to oral contraceptives and the right to reproductive freedom. For trans folks, hormone replacement therapies are where they source their gender and sexual identities, and often are even a measure of safety in order to "pass" in public and guard against transphobic violence. While we cannot overlook the large collective efforts, the legislative fights, the mobilizing of movements in the pursuit of hormonal access, we also can't ignore the incredible biopolitical power appointed to hormones to begin with, that countless bodies are subjugated under the pharma-laboratory-clinic triad which defines, controls, pathologizes, and prioritizes bodies over others.

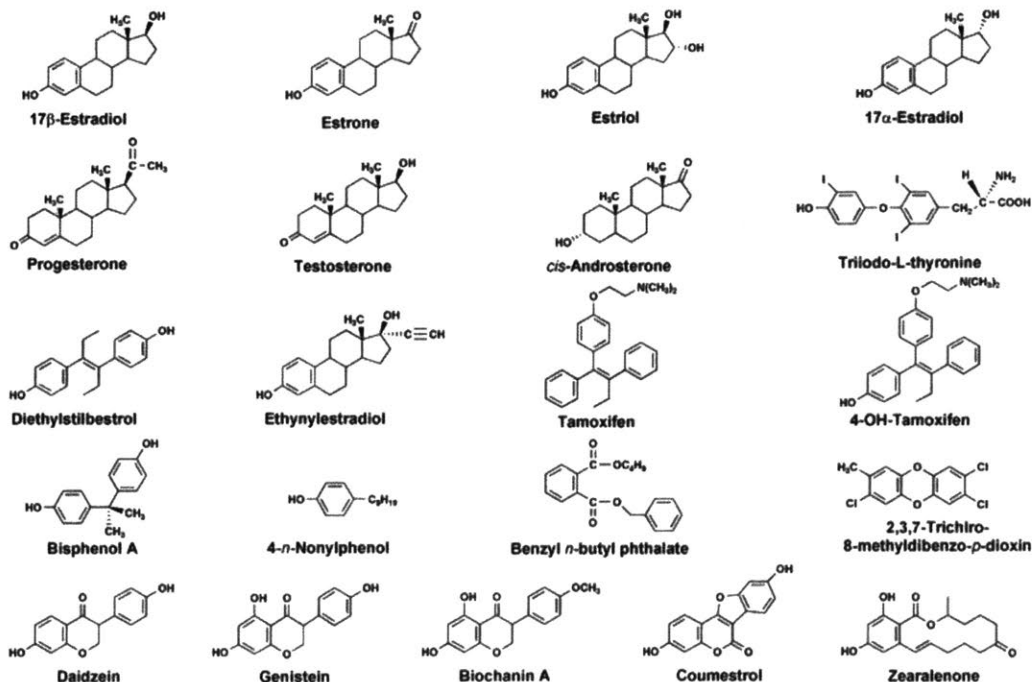
### Molecules of Disruption

While scientific and corporate institutions regulate and discipline bodies through hormonal management, similar dominant forces perpetuate a toxic planet through hormonal *pollution*. Plasticizers, pesticides, pills, personal care products, casings for electronics and hardware, these are all examples of

<sup>8</sup> Simmons, Eve. "These Women Say They Were Kicked Out of Sports Because of Their Gender." *Broadly*. Accessed May 23, 2017. [https://broadly.vice.com/en\\_us/article/trans-and-intersex-women-kicked-out-of-sports](https://broadly.vice.com/en_us/article/trans-and-intersex-women-kicked-out-of-sports).



corporate-industrial products which contain “endocrine disrupting chemicals” (EDCs) or “xenoestrogens.” Since as early as the 1900s when the first plastic compound was produced (Bakelite<sup>9</sup>, a product invented by Leo Baekeland in 1907, New York City), these molecules of disruption have completely pervaded our planet, irreparably altering its metabolism and transfecting morphological and physiological change to its bodily inhabitants. Writer Heather Davies describes the accumulation of plastics and toxicities as a kind of “geologic indigestion<sup>10</sup>,” a marker of the Anthropocene where the natural can no longer be disentangled from the synthetic.



#### Image depicting molecules of endocrine effects, both naturally and synthetically produced.

Triclocarban in soap, dioxins in pesticides, phthalates in plasticizers, bisphenol-A in canned foods, parabens in lipstick, and synthetic estrogens in hormone pills - these EDC's represent what writer Rob Nixon calls “slow violence<sup>11</sup>,” an invisible yet pervasive toxicity whose gradual effects are almost impossible to perceive. Their global environmental effects and public reaction are akin to the climate change “debate” where catastrophe in the public discourse (unlike bombs falling over the Middle East) is difficult to pinpoint and easy to refute by corporate lobbyists. Furthermore, many cases of hormonal pollution come with class and racial bias, having a tendency to affect those impoverished, marginalized, and forgotten. The “scandals” are endless, but I just name a few. A village of Mexican farmers suffered

<sup>9</sup> “Bakelite First Synthetic Plastic - National Historic Chemical Landmark.” *American Chemical Society*. <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/bakelite.html>.

<sup>10</sup> (2015) “Toxic Progeny: The Plasticsphere and Other Queer Futures” *PhiloSOPHIA* 5.2 (Summer): 232-250.

<sup>11</sup> Nixon, Rob. *Slow Violence and the Environmentalism of the Poor*. Cambridge, MA: Harvard UP, 2013.

acute poisoning and chronic conditions from working in pesticide ridden fields<sup>12</sup>. Diethylstilbestrol (DES) mentioned earlier as a synthetic estrogen therapy for pregnant mothers, was finally discontinued after 30 years after enough cancers and birth defects were correlated to its usage. A swathe of transgender frogs were discovered with ovarian organs next to testicular organs, as a result of synthetic pesticide Atrazine<sup>13</sup>, leading to vast population declines in areas with heavy pesticide runoff. And finally Rachel Carson's *Silent Spring* was monumental in raising awareness on the carcinogenic effects of pesticide DDT, which severely compromises the body's hormonal balance<sup>14</sup>.

In 2003, the European Commission hired Dutch engineering consultancy BKH<sup>15</sup> to establish a priority list of endocrine disrupting chemicals to be examined and assessed. From a candidate list of 553 substances, 146 were considered to be "either persistent in the environment or produced at high volumes." This study was conducted almost 15 years ago without any impedance to manufacturing more substances, so the list is likely to have largely increased. The endocrine disrupting molecules are able to alter the hormones systems of humans and non humans and non human species, giving their name "endocrine-disrupting." The effects<sup>16</sup> range from morphological (hypospadias, male breast development) to neurological (depression, autism, lower IQ) to physiological (early onset puberty, ovarian cancer, worldwide sperm count drop), and do not select for gender. Of the effects which target reproductive systems, these are blatant examples where sex is not produced deterministically through chromosomes, genetics, or gonad-produced hormones, but modulated through industrial byproducts of our anthropogenic activities. These chemicals problematize our fixed notions of gender sex, and prompt us to view our bodies as changeable substrates - a malleability inherent to our biological makeup but alien to our prescribed constructs of (eco)heteronormativity.

## The Future is Queer

Preciado states that heterosexuality "must be understood as a politically assisted procreation technology." The concept of reproductive futurism is founded on the ultimate privilege of the heteronormative class. This is one of the more prevailing political discourses not only for building neoliberal systems but also for dealing with apocalyptic visions of extinction. So from what has been said about hormonal production of normative bodies, male and female binaries, and about the hormonally

---

<sup>12</sup> Payán-Rentería, Rolando, Guadalupe Garibay-Chávez, Raul Rangel-Ascencio, Veronica Preciado-Martínez, Laura Muñoz-Islas, Claudia Beltrán-Miranda, Salvador Mena-Munguía, Luis Jave-Suárez, Alfredo Fera-Velasco, and Ruth De Celis. "Effect of Chronic Pesticide Exposure in Farm Workers of a Mexico Community." *Archives of Environmental & Occupational Health* 67, no. 1 (2012): 22–30. doi:10.1080/19338244.2011.564230.

<sup>13</sup> S, Robert, ers, Media relations "Pesticide Atrazine Can Turn Male Frogs into Females." *Berkeley News*, March 1, 2010. <http://news.berkeley.edu/2010/03/01/frogs/>.

<sup>14</sup> Carson, Rachel. *Silent Spring*. N.p.: Mariner (Houghton Mifflin), 2002.

<sup>15</sup> "Chemicals - Environment - European Commission." [http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances\\_en.htm](http://ec.europa.eu/environment/chemicals/endocrine/strategy/substances_en.htm).

<sup>16</sup> "WHO | Effects of Human Exposure to Hormone-Disrupting Chemicals Examined in Landmark UN Report." *WHO*. [http://www.who.int/mediacentre/news/releases/2013/hormone\\_disrupting\\_20130219/en/](http://www.who.int/mediacentre/news/releases/2013/hormone_disrupting_20130219/en/).

active molecules which pervade our environments and alter our morphologies, the question must be posed: do queering bodies have no future<sup>17</sup> in our toxic landscape?

With mainstream media reports on alligator micro-penises, chemically castrated roosters, and ovaries grown alongside the testicles of frogs and fish, endocrine disruption represents a massive threat, a toxic assault on the masculine construct. It is an epistemic crisis to heteronormative reproduction and binary classification, setting off western cultural anxieties of gender-bending, feminization, and loss of masculinity. The focus on the “gender-bending” effects of EDCs where other physiological effects such as cancers, tumors, neurological diseases, and obesity become secondary, stems from a deeply entrenched protection of a natural order, of heterosexual binaries. When eco-conservatist, environmentalist discourse capitalizes on stories of transgender fish to pressure congressmen to ban pollution, they are really supporting a politics of purity that feeds on queer phobia. Giovanna do Chiro regards this eco-heteronormative agenda as a “polluted politics<sup>18</sup>” where the very battles for eco-conservation come tainted with phobia for non-binary, disobedient bodies and intersexual ways of being.

I want to tease apart the irony a bit and take for example, plastic, as the most abundantly produced endocrine disrupting molecule. This material captures every minutiae of our anthropocentric fantasies<sup>19</sup>- the desire to be pristine, closed systems that are barricaded from the free radicals of the outside, that we can mold our bodies into the ideal shape (plastic surgery), that we can be both flexible and impenetrably stable. At the same, we do fulfill our plastic fantasies by the simple fact that our bodies can “queer” on the molecular level, which causes them to diverge morphologically from the representations we see in biology textbooks and magazines. Our entanglement with plastics (and other related compounds) is precisely what reveals our inherent plasticity. It is this very material that problematizes the binary notion of male and female bodies. The reality of our permeable, mutable bodies readily dissolves the fantasy of a closed, binary system, and this is perhaps the discourse that must be adopted to liberate us.

Rather than affirming the panic through eco-conservationist, eco-heteronormative discourse, can we shift from toxic shame to toxic embrace, creating a discourse with some semblance of emancipation? In March of 2016, British scientists hybridized two species of cichlids, freshwater fish, resulting in a new hermaphrodite species which they then called a “hopeful monster<sup>20</sup>” because it was able to self-reproduce in environmental conditions where it could not find a mate. Metaphors like the “hopeful monster” help neutralize fear, to deliver alternative visions of toxic becoming that are not confined to a discourse of purity, moralizing protection of nature, nor apocalyptic doom. Donna Haraway in *Staying with*

---

<sup>17</sup> Edelman, Lee. *No Future Queer Theory and the Death Drive*. Durham: Duke UP, 2007.

<sup>18</sup> DI CHIRO, GIOVANNA. “Polluted Politics?: Confronting Toxic Discourse, Sex Panic, and Eco-Normativity.” In *Queer Ecologies: Sex, Nature, Politics, Desire*, edited by Mortimer-Sandilands Catriona and Erickson Bruce, 199-230. Indiana University Press, 2010.

<sup>19</sup> (2015) “Plastic: Accumulation without Metabolism” in catalogue for *Placing the Golden Spike* Milwaukee: INOVA.

<sup>20</sup> Svensson, Ola, Alan Smith, Javier García-Alonso, and Cock van Oosterhout. “Hybridization Generates a Hopeful Monster: A Hermaphroditic Selfing Cichlid.” *Royal Society Open Science* 3, no. 3 (March 1, 2016): 150684. doi:10.1098/rsos.150684.

*the Trouble*<sup>21</sup> also urges us to “make kin, not babies,” a process which is perhaps the hardest but most urgent in this time of The Chthulucene, an ever-tentacular moment not just within the framework of human society but as a kind of multispecies ecojustice view for shared vulnerability. If we could perceive on the span of evolutionary time, the xeno-molecules undergo a semiosis with our bodies and bodies of non human species, signal to our receptors, and effect morphological and physiological change, thereby “increasing the range of bio-queer options.” The process of semiosis, or “sense-making” at the molecular level must extend to our socio-cultural discourse: we must acknowledge the inherent malleability and plasticity of the body for this “sense-making.” The body as an unstable medium<sup>22</sup> invites intervention from a queering landscape, because adapting, not barricading, is how it builds resilience for a toxic future.

## QUEER BODY WORSHIP?

**Hybridization generates a hopeful monster: a hermaphroditic selfing cichlid**  
Ola Svensson, Alan Smith, Javier Garcia-Alonso, Cock van Oosterhout  
Published 23 March 2016 DOI: 10.1098/rsos.150064

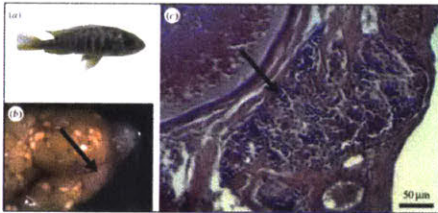


Image speculating on narrative of queer body worship.

<sup>21</sup> Haraway, Donna Jeanne. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke UP, 2016.

<sup>22</sup> Al-King, Malin, and Eva Hayward. "Toxic Sex: Perverting Pollution and Queering Hormone Disruption." *O-Zone: A Journal of Object-Oriented Studies* 1 (2013)

# PRECEDENTS

## Transgenic Production and Cultural Resistance: A Seven-Point Plan

1. Demystify transgenic production and products
2. Neutralize public fear
3. Promote critical thinking
4. Undermine and attack Edenic utopian rhetoric
5. Open the halls of science
6. Dissolve cultural boundaries of specialization
7. Build respect for amateurism

23

### **Biotechnical Civil Disobedience**

The term “biotechnical civil disobedience” comes from the discourse of Critical Art Ensemble<sup>24</sup> (CAE), a prominent art and tactical media collective with pioneering works around bioterrorism, germ warfare, transgenic foods, and the unconsenting commodification of bodies. They address a growing issue in biotechnology where the lay-public becomes increasingly divested from its political repercussions. A very notable example was the very silent approval and circulation of transgenic foods unbeknownst to a vast majority of the public. As a response, in a 2002 project called *Molecular Invasion* in collaboration with Beatriz da Costa and Claire Pentecost, CAE reverse-engineered Monsanto’s soybean seeds to lose its resistance to the glyphosate-based herbicide. Normally every year, farmers would have to purchase both the seeds and the herbicide as a package according to the license guidelines accompanying the patented lifeform. Reversing the organism’s licensed function, CAE demonstrated that organisms too can be hacked and repurposed for “contestational biology,” a form of social resistance where members of the lay-public perform science outside institutional walls in order to challenge the status quo. They performed this experiment in the public, a process their collaborator Claire Pentecost terms “public amateurism,” where a person takes on bodies of knowledge outside their own and situates this process in the public sphere. This practice removes the hierarchy of the expert, builds respect for the

---

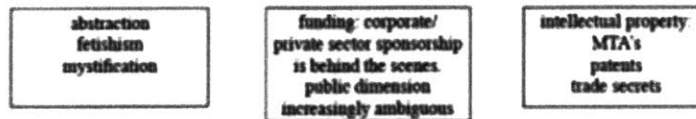
<sup>23</sup> Critical Art Ensemble. *The Molecular Invasion*. New York: Autonomedia, 2003.

<sup>24</sup> “Critical Art Ensemble.” <http://critical-art.net/>.

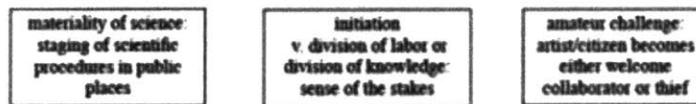
amateur, and contextualizes tacit knowledge (how to perform science and scientific protocols) within the socio-political issues at stake.

## SCIENCE UNDER NEOLIBERALISM

barriers or  
mechanisms of alienation  
serving to maintain or extend the status quo



ARTIST  
strategies of interruption  
forms of contact/experience



AUDIENCE (PUBLIC SPHERE):  
visitors to museums and other venues, students,  
consumers, scientists, artists, activists

25

Today, the do-it-yourself biology movement (DIYBio) is credited for providing communal shared spaces and collaborative venues for researching biology, biohacking, biotinkering, and creating biological art. This movement is a subset of a much larger decentralization process of assets and activities tied up in industrial corporations, for example, decentralized fabrication through Fablabs and makerspaces, decentralized finance through crowdfunding, etc. Written into its code of ethics, DIYBio strives to provide greater transparency to the black boxes of science by democratizing the tools and knowledge normally kept behind closed laboratory doors. Therefore at the core of biotechnical civil disobedience is the demystification of science: the way it is performed, politicized, and marketed to the masses.

In 2015, a community of biohackers in the Bay Area space Counterculture Labs<sup>26</sup> set out to crowdfund a project for Open Insulin<sup>27</sup>. They proposed a more efficient method for synthesizing insulin that would reduce its cost of production, critiquing today's dominant pharmaceutical methods of synthesis and the barrier to access than many people face. Another individual named Michael Laufer takes this practice of "indie drugs" a step further. Founder of a collective called Four Thieves Vinegar<sup>28</sup>, he uses a DIY chemical reactor and algorithmic search engine for chemical reactions and precursors to

<sup>25</sup> "Claire Pentecost: When Art Becomes Life | Eicpc.net." [http://eicpc.net/transversal/0507/pentecost/en/base\\_edit](http://eicpc.net/transversal/0507/pentecost/en/base_edit).

<sup>26</sup> "Counter Culture Labs." *Counter Culture Labs*. <http://www.counterculturelabs.org/>.

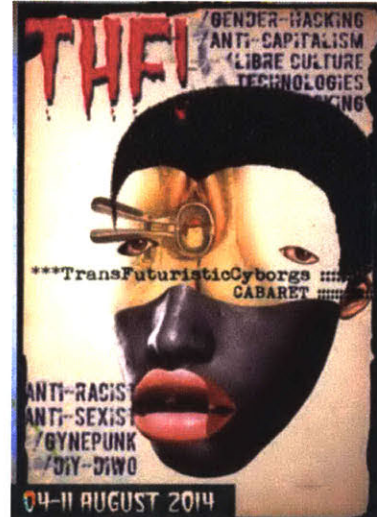
<sup>27</sup> "Open Insulin." *Experiment - Moving Science Forward*. <https://experiment.com/projects/open-insulin>.

<sup>28</sup> "Four Thieves Vinegar." <https://fourthievesvinegar.org/>.



relevant perspectives. In the 90s, cyberfeminist groups like VNS Matrix<sup>30</sup>, the “saboteurs of big daddy mainframe,” paved the way for a networked feminism that both exploits and critiques the Internet, pushing for a coevolution between women and technology. SubRosa<sup>31</sup> is one of several cyberfeminist collectives who began targeting biopolitical issues around emerging reproductive technologies of the time, such as in-vitro fertilization and stem cell technologies. They often used theater-style performances to enact familiar tropes of science, thereby subverting the rhetorical power of corporations and institutions that primarily target and commodify female bodies.

A contemporary of the cyberfeminist, post-gender, and free technology movements, the Transhackfeminist<sup>32</sup> collective from Calafou, Spain radically reclaims the female body through DIY gynecology practices they perform and disseminate through the Gynepunk Lab<sup>33</sup> which they define as a “riot of bodies.” Notable projects include the 3D-printed design of the speculum, DIY urinalysis tests, and the rewriting of the violent history behind modern gynecology. Lastly, the Xenofeminist<sup>34</sup> Manifesto by a collective Laboria Cuboniks, asserts that technology isn’t inherently progressive nor utopian, that inscribed in it is an alienation that will be its ultimate undoing. It speaks against the use of naturalist discourse to affirm systems of gender and race imbalances, because freedom’s construction “needs not less, but more alienation.” If alienation is the potent impetus to generate new, more equitable worlds, then why don’t we rid the normative discourse that stands in its way. So, in the final words of the manifesto, “if nature is unjust, change nature!”



From 2014 Hack the Earth event at Calafou, Spain.

<sup>30</sup> “Vns Matrix.” *Vns Matrix*, <https://vnsmatrix.net/about/>.

<sup>31</sup> “subRosa | a Cyberfeminist Art Collective.” <http://cyberfeminism.net/>.

<sup>32</sup> “THF! / TransHackFeminist Manifesto!” <https://transhackfeminist.noblogs.org/post/2014/07/29/transhackfeminist-manifesto/>.

<sup>33</sup> “GynePunk, the Cyborg Witches of DIY Gynecology.” *Makery*.

<http://www.makery.info/en/2015/06/30/gynepunk-les-sorciereres-cyborg-de-la-gynecologie-diy/>.

<sup>34</sup> Cuboniks, Laboria. “Laboria Cuboniks | Xenofeminism.” <http://www.laboriacuboniks.net/>.



# APPROACH

*Open Source Estrogen*<sup>35</sup> began with a speculative question: what if it were possible to synthesize estrogen in the kitchen? This is not a purely scientific question of how to chemically make estrogen like some kind of covert meth lab, let alone appropriating said protocols to fit the modest instruments of a kitchen. It requires uncovering the socio-political history of hormones, how they were assigned their institutional biopower, and how their pervasive presence in our environments problematizes our social notions of gender. The act of “hacking” not only refers to the hacking of organisms, hardware, and protocols - it represents equally the unearthing of deeply entrenched notions (black-boxed knowledge) of sex and gender, and the various ways institutions both regulate and pollute our bodies and bodies of nonhuman species. For example when I work with collaborators and participants to extract estrogenic pollutants from a local river, not only do we translate esoteric laboratory protocols into feasible “recipes,” we also begin to investigate the institutional actors who have “queered” the river and how we can move beyond (now) knowing these scandalous levels of estrogen in the environment (how to be of-a-world). Therefore the project employs the following strategies for creating new subjectivities for living in a hormonally-colonized world:

- 1) **BIOHACKING & PUBLIC AMATEURISM:** Demystify esoteric laboratory protocols and collaboratively develop low-cost accessible biohacking tools and methodologies that act as critical engagements in the public sphere.
- 2) **CRITICAL STORYTELLING:** Infuse social and cultural meaning through speculative design and storytelling in order to move beyond fears and anxieties and produce new subjectivities which refigure the world.

## The Role of Speculative Design

Coined by designers Fiona Raby and Anthony Dunne in their 2013 book *Speculative Everything - Design, Fiction, and Social Dreaming*<sup>36</sup>, speculative design emerges from a growing dissatisfaction with the techno-utopian rhetoric which has been dominating the marketing of emerging technologies. It is a design strategy which, instead of prescribing visions of the future in a top-down manner, provides alternative visions that are contemplative, and require reflexivity. It is taking something which does not exist yet and manufacturing its potential narrative in our material reality, thereby exploring its agentic potential and how it would exist in our present social, cultural, and capitalistic paradigm. Donna Haraway

---

<sup>35</sup> “Open Source Estrogen (2015) - M.A.G.I.C.” <http://maggic.ooo/Open-Source-Estrogen-2015>.

<sup>36</sup> Dunne, Anthony, and Fiona Raby. *Speculative Everything: Design, Fiction, and Social Dreaming*. S.l.: MIT, 2014.

also describes how “speculative fiction” or “SF” can also stand for science fiction, speculative feminism, science fact, and string figures.<sup>37</sup> In the case of *Open Source Estrogen*, speculative design serves to redefine and refigure our bodies, societies, and ecosystems which have been colonized by hormones. A biopolitical issue with very real agency in the world, how can we even begin to negotiate this tension between *active* (hormone therapies) and *passive* (molecular disruption) queering? Can we imagine an alternative vision where we take back control of our bodies and produce our own hormones? Where we can farm areas of estrogenic paradises for our own use? Where we turn toxic shame into toxic embrace, acknowledging the queering power of our plastic progeny?

As an exercise in speculative design, I created a short film project called *Egstrogen Farms*<sup>38</sup>, a fictional company that advertises transgenic chicken eggs to women who wish to ovulate more frequently. Inspired by subRosa’s research<sup>39</sup> into the similarities between women and chickens as egg producers for hegemonic labor forces, and the field of avian transgenic technologies (ATT) which aims to produce pharmaceutical drugs in the whites of eggs, the project imagines a confluence between agricultural and pharmaceutical industries to market a product towards women, targeting their reproductive capacities. The transgenic chickens lay “Egstro Eggs” containing a cocktail of gonadotropins which would allow women to ovulate as frequently as chickens do. This novel effect would be especially helpful to women who are trying to get pregnant and start a nuclear family, or who are working as egg donors for the assisted reproductive technology (ART) industry. The commercial’s tag line states, “One egg a day is the fertility way.” Although the field of ATT is yet to reach the consumer market, it is an area where one can speculate what an egg can mean in a utilitarian sense for a corporate industry, and how the egg might exist symbolically and culturally once it leaves the laboratory and into the public.



**Video still from *Egstrogen Farms* commercial.**

So what about cooking estrogen in the kitchen? The very idea of estrogen synthesis in a domestic setting rather than through a physician’s prescription immediately evokes questions such as: well who is

<sup>37</sup> Haraway, Donna Jeanne. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke UP, 2016.

<sup>38</sup> “Egstrogen Farms (2015) - M.A.G.G.I.C.” <http://maggic.ooo/Egstrogen-Farms-2015>.

<sup>39</sup> *Cultures of Eugenics*, 24-page pamphlet, unlimited edition (produced for *U-Gen-A-Chix*)

producing hormones and controlling its distribution? What are the various uses of prescription hormones? Whose bodies apply, and of those bodies who are granted access? Elicited by a simple fictional image of a transwoman cooking up hormones in her kitchen, these questions are inherently biopolitical and examine the past and current endocrinological management of bodies for reproduction, hormone disorders, and sexual identity. The power of speculative design here is a seed for provocation, for civil disobedience, for problematizing the deeply entrenched systems of hormonal management and production of heteronormative bodies.



**Video still from *Open Source Estrogen: Housewives Making Drugs* video<sup>40</sup>.** This is a kind of “manifesto video” for the Housewives Making Drugs iteration of Open Source Estrogen. The actress is a transfemme artist named Eliza who is student of the project’s collaborator Byron Rich at Allegheny College.

#### Script of the Audio:

“Open Source Estrogen, Housewives Making Drugs combines do-it-yourself science, body and gender politics, and ethics of hormonal manipulation. The goal of the project is to create DIY protocols for estrogen biosynthesis. The kitchen is a politically charged space prescribed to women as their proper dwelling, making it the precise context for performing an estrogen synthesis recipe. With recent developments in the field of synthetic biology, the customized kitchen laboratory can be a ubiquitous possibility in the near future. Open access estrogen would allow women and transgender females to exercise greater control over their bodies by circumventing governments and institutions. We want to ask: what are the biopolitics governing our bodies? More importantly, is it ethical to self-administer self-synthesized hormones?”

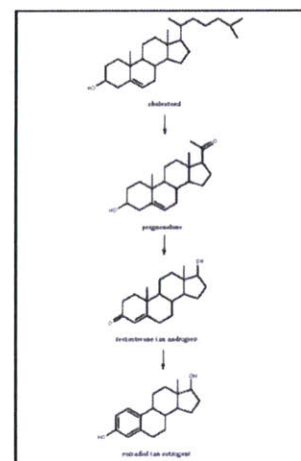
<sup>40</sup> maggic. *Open Source Estrogen: Housewives Making Drugs*, 2015. <https://vimeo.com/143059738>.

While *Open Source Estrogen* uses speculative design tactics to explore the limits of the possible, it also necessarily uses scientific approaches for the very same reason. After issuing this manifesto video, the question is obviously prompted: what if this fictional scenario was real? At this point the project diverges from speculation and into the tangible facets of a real and troubled world. What is at stake is the issue of body sovereignty, how bodies can be “stolen” through hormonal technologies and residues of capitalistic industrialization. This is precisely why the project aims to emancipate the estrogen molecule, create portals of access and understanding, and deliberately hack the xeno-forces at play. At the same time, the project does not promote any kind of techno-solutionism or alternative vision of gender emancipation through biotechnologies. It stays critical of itself, its ethics constantly in review, working and collaborating with those bodies who are most at stake. While this investigation necessitates scientific research and practice, it doesn't place its glorification nor solutionism at the center point.

## Initial Scientific Approaches

The project initially proposed to perform *in vivo* synthesis using transgenic yeast whose metabolic pathway would be altered to produce estrogen from a cholesterol precursor. The idea first came from one of my collaborators Byron Rich<sup>41</sup>, an artist and professor of Electronic Media at Allegheny College. Byron mentioned that he and his wife had had trouble getting access to birth control pills, and he asked, “what if there was an open source protocol for making your own birth control pills?” I asked if he tried any experiments. “I tried isolating cholesterol from an egg yolk, since you need cholesterol first to make estrogen,” he replied. This led me to wonder if it were possible to engineer an organism of a simpler mammalian form to produce estrogen *in vivo*.

The image shows a screenshot of a chemistry education article. At the top left is the logo for 'JOURNAL OF CHEMICAL EDUCATION'. To the right, it says 'LABORATORY EXPERIMENT' and 'pubs.acs.org/chemeduc'. The title of the article is 'Isolation of Cholesterol from an Egg Yolk' by Douglass F. Taber, Rui Li, and Cory M. Anson. Below the title is the authors' affiliation: 'Department of Chemistry and Biochemistry, University of Delaware, Newark, Delaware 19716, United States'. There is a link for 'Supporting Information'. The abstract describes a procedure for isolating cholesterol from an egg yolk using hydrolysis, extraction, and column chromatography. It mentions that cholesterol can be purified and converted to cholesterolone. A small image shows two chemical structures: cholesterol and cholesterolone. The keywords include: Second-Year Undergraduate, Laboratory Instruction, Organic Chemistry, Hands-On Learning/Manipulatives, Alcohols, Aldehydes/Ketones, Chromatography, Natural Products, Oxidation/Reduction, Steroids.



**Initial approach of *Open Source Estrogen*** to convert cholesterol of chicken eggs into estrogen.

<sup>41</sup> “Byron Rich.” <http://www.byronrich.com>.

Yeast as a model organism in the laboratory as well as common baking ingredient in the kitchen was the perfect organism on both technical and metaphorical levels. I was also interested in the ethics of creating such a postnatural organism. It was bioartist Adam Zaretsky<sup>42</sup> who said to me in 2013 in an interview, “the ethics are not something you debate. The ethics are stamped into anatomy and physiology of the organism in question.” What would it mean, ontologically, for a transgenic yeast whose sole purpose for existence was to be an estrogen factory? And furthermore, an estrogen factory which would disrupt the dominant distribution pathways of estrogen products as a form of contestational art rather than of academic-corporate use-value?

I spent the first months searching for a scientific collaborator, meeting with several synthetic biologists from the Harvard Wyss Institute who were conducting forced mutagenesis directed evolution experiments, creating plants which metabolized progesterone, and assembling strands of DNA on conductive coils which react to the presence of estrogenic compounds: all kinds of projects that I wanted to work with. Despite my academic affiliation with MIT, my position as an investigative artist meant I had to prove the research value (potential for a publication) of my proposed collaboration. Therefore I began to do some research on the feasibility of conducting a daunting experiment like this on my own. In order to engineer the metabolic pathway of an organism, the first step is to discern which genes would have to be incorporated into the host organism, or as they say in the bioengineering field, the “chassis organism.” A quick search on KEGG, The Kyoto Encyclopedia of Genes and Genomes<sup>43</sup>, proves that the yeast estrogen factory would be no easy feat. For yeast to synthesize estrogen from a cholesterol precursor, a total of five enzymatic reactions must be catalyzed to reach the final state of estradiol-17-beta. Each enzyme is coded by gene which must be genetically engineered into the chassis organism. Several synthetic biologists I spoke with cautioned that this would be incredibly taxing for the yeast organism, and would not count on their survival.

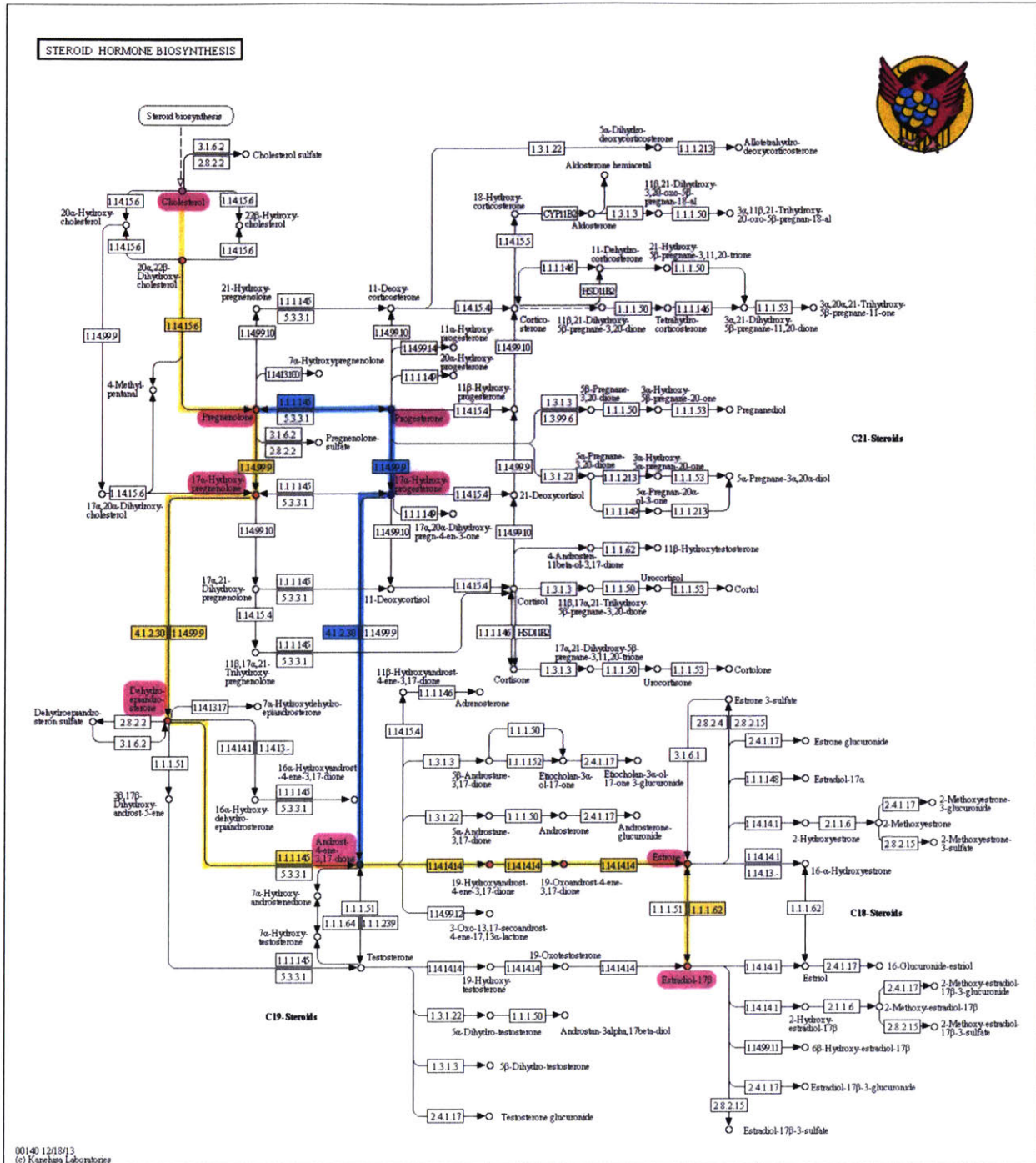
The disappointing news was a blessing in disguise. There are many alternative avenues for the acquisition of hormones. As mentioned previously, our environments are saturated by them, certain plants produce them naturally, and are freely excreted in the urine. The roadblock I encountered with synthetic biology (“high tech biology”) meant I had to explore other alternatives, a journey which brought me to new collaborations, communities of like-minded individuals, abroad and outside of the MIT-Harvard institutions. It prompted me to develop protocols on my own and document and realize them in my own way. Furthermore it led me to take my protocols outside my institution, to truly field-test them through travel, unpacking and repacking, and prototyping in diverse venues and environments. The following three parts will discuss 1) a nomadic “lab-in-a-box” practice of estrogen hacking and scientific

---

<sup>42</sup> DIYSECT. *Adam Zaretsky on the Role of Artists*, 2013. <https://vimeo.com/73838256>.

<sup>43</sup> “KEGG PATHWAY: Steroid Hormone Biosynthesis - Reference Pathway.” [http://www.kegg.jp/kegg-bin/show\\_pathway?map00140](http://www.kegg.jp/kegg-bin/show_pathway?map00140).

appropriation, 2) the making of a fictional cooking show starring transwomen, and 3) three different iterations of *Open Source Estrogen* exploring hormone micro-performance and toxicological embrace.



**KEGG Map of Steroid Biosynthesis Pathway.** Color-annotated by myself. Number codes highlighted in yellow correspond to enzymes required to carry out each reaction.



## PART I: ESTROFEM! LAB

In response to the various ways hormones perform a molecular colonization on our bodies and ecosystems, how do we as affected bodies effectively respond? Can we harness civic action to create DIY/DIWO protocols and recipes for hacking hormones that are founded in both equity and accessibility? A trajectory of *Open Source Estrogen* which employs collaborative workshoping as scientific appropriation, the *Estrofem! Lab*<sup>44</sup> generates low-cost, accessible tools and protocols for hacking estrogen, demonstrating its molecular colonization and biopolitical ubiquity. The following chapter will describe the making of three main protocols: YES-HER yeast estrogen biosensors, urine-hormone extraction, and DIY solid phase extraction, and why these protocols were necessarily nomadic in their design and implementation. This section will also discuss how biohacking as a methodological practice for any artist or lay-person can facilitate new intimacies and subjectivities towards a given research area that they would not gain otherwise in a traditional academic setting. Lastly, a series of Estrofem! Workshopology survey responses by participants are analyzed to reflect on the subjective experience of each hormone hacking session with the public.

### Estrogen Geeking and Freak Science

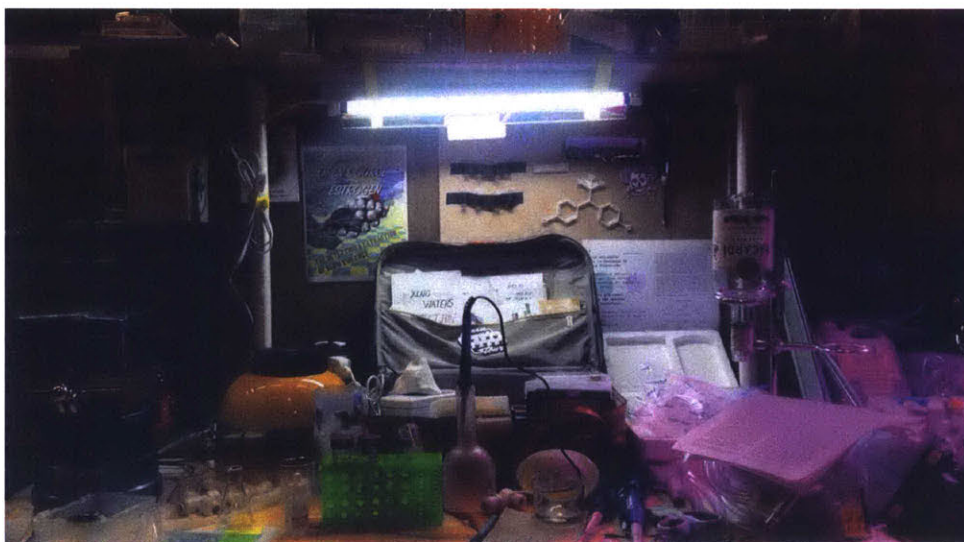


Image from studio lab space at MIT Media Lab built out over the course of a year.

Sometimes I tell people I'm an *oestrohacker*, or that I make *freak science*, or that I'm a deranged housewife cooking hormones in the kitchen. Despite the embedded sarcasm, I mean them as no joke - it's

<sup>44</sup> "Estrofem! Lab (2016) - M.A.G.G.I.C." <http://maggic.ooo/Estrofem-Lab-2016>.

how I can communicate a practice which is beyond an artist working in a laboratory who inserts experiments from one white box (the laboratory) into another (the gallery). While it was important for me to “get my hands wet” in laboratory practice, it was equally, if not more important for my practice to “leave” the laboratory and interact with the bodies, environments, and discourses to which it pertains.

Workshopology describes collaborative hands-on experimentation as an iterative process and design strategy that takes feedback from its own mishaps, accidents, and participant experiences in order to develop new methodologies in the future. I first encountered the term “workshopology” during an event called HackteriaLab14 in Yogyakarta<sup>45</sup>, Indonesia organized by the global online network Hackteria | Open Source Biological Art and the local Indonesian community, Lifepatch<sup>46</sup> citizen initiatives in art, science, and technology. In the workshops and events I experienced a kind of horizontal knowledge transfer that was without hierarchy of the expert nor the mimicking of typical laboratory design. Related is the ethos of *homo ludens*, the concept of communal playing, tinkering, and geeking as an important element for intimate knowledge acquisition of the material and the cultural production around it. I also use the phrase “estrogen geeking” to describe an exploratory process whereby I assume the role of an amateur un-socialized as a laboratory scientist and gain intimate knowledge towards the medium I am working with, in this case, estrogen. In my geeking, tinkering, and research, I emancipate the estrogen molecule from its hidden arenas, collaborate with people outside my own discipline, and disseminate my discoveries to whoever is interested to listen.

The result of several workshopologies is the *Estrofem! Lab*, a mobile bio-lab containing tools and protocols to hack the hormones present in our bodies and our environment, creating a potential non-institutional portal for hormone access as well as a cultural dialogue for biopolitics. Often regarded as hobo science, freak science, or public amateurism, the *Estrofem! Lab* and its workshopologies aim to detect and extract estrogen from “sources with meaning,” providing the contextual framework for why we hack estrogen, and why we perform science as citizens and (hack)activists. This evolving workshopology has led to creation of yeast estrogen sensors (YES-HER yeast) containing human estrogen receptor for detection, vacuum pump solid phase extraction (SPE) using cigarette filters and smashed silica gel, and reverse phase column chromatography using hacked glass bottles and methanol.

### **YES-HER Yeast Biosensors: Does it say YES to HER?**

The first protocol developed as part of the *Estrofem! Lab* was the YES-HER yeast. YES stands for “yeast estrogen sensor” and HER stands for “human estrogen receptor.” Because endocrine disrupting compounds are usually found in minimal amounts (ng/L-1) in the water, one of the most common

---

<sup>45</sup> “HackteriaLab 2014 - Yogyakarta - Hackteria Wiki.” [http://hackteria.org/wiki/HackteriaLab\\_2014\\_-\\_Yogyakarta](http://hackteria.org/wiki/HackteriaLab_2014_-_Yogyakarta).

<sup>46</sup> “Lifepatch - Citizen Initiative in Art, Science and Technology.”

[http://lifepatch.org/Lifepatch\\_-\\_citizen\\_initiative\\_in\\_art,\\_science\\_and\\_technology](http://lifepatch.org/Lifepatch_-_citizen_initiative_in_art,_science_and_technology).



techniques for their detection is liquid chromatography-tandem mass spectrometry (LC-MS). But this approach is very expensive to perform on a routine basis, requiring both skilled personnel and a robust quality assurance/control program. The YES-YEAST (yeast estrogen sensor) are a laboratory strain of *Saccharomyces cerevisiae* (W303) that have been genetically modified to contain Human Estrogen Receptor (HER). They act as a biosensor: the input is estrogen and the output is a yellow color change. More importantly, the YES yeast are extensions of our bodies: what binds to their receptors also bind to ours, demonstrating a direct biological response to xenoestrogens on our bodies. This bioassay detection method is more sensitive than the chemical approach either detecting estrogenic target compounds at lower concentrations, other non-target compounds, and synergistic effects that chemical methods and machines fail to detect.

**Review: The Methods of Identification, Analysis, and Removal of Endocrine Disrupting Compounds (EDCs) in Water**

**Table 3**  
Reported detection and quantification limits of different analytical methods for various EDCs in water samples.

Method	Detection limit (ng/l)	Ref.
E-Screen	0.27	
ER-CALUX <sup>a</sup>	0.14	
YES <sup>b</sup>	0.3–30	[34]
ELISA <sup>c</sup>	20–40	[34]
LC-MS/MS	0.08–33	[85]
SPE-GC/MS	12–32	[85]
GC-MS/MS	0.05–2.4	[34]
SPME-HPLC <sup>d</sup>	0.064–1.2	[34]
SPE-HPLC/ESI-MS/MS <sup>e</sup>	3.5–44	[86]

- <sup>a</sup> Estrogen responsive chemically activated luciferase expression.
- <sup>b</sup> Yeast estrogen screen.
- <sup>c</sup> Enzyme-linked immunosorbent assay.
- <sup>d</sup> Solid-phase microextraction–high performance liquid chromatography.
- <sup>e</sup> Solid-phase extraction–high performance liquid chromatography with positive electrospray ionization and tandem mass spectrometry.

**Slide image presenting the paper “The methods of identification, analysis, and removal of endocrine disrupting compounds (EDCs) in water” (2009)<sup>47</sup> which reviews different methods of EDC analysis, noting the efficacy of YES-HER detection method in comparison to typical laboratory machines.**

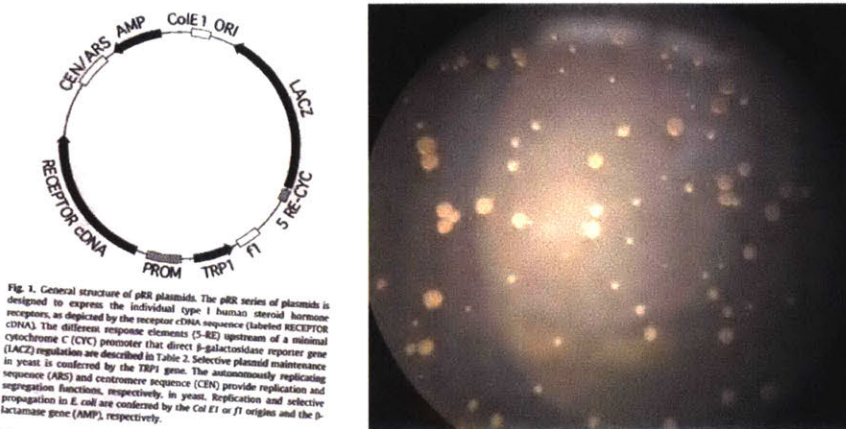
The YES HER plasmid was previously constructed by Miller et al outlined in the paper “Single Plasmids Expressing Human Steroid Hormone Receptors and a Reporter Gene for Use in Yeast Signaling Assays” (2009)<sup>48</sup>, and was purchased from Addgene repository for \$65. The plasmid arrived in an agar stab with *E. coli* containing the plasmid, which had to be purified with a standard mini prep. With the help of Vanessa J. Cheung from the bio lab 68-074 on MIT campus, the DNA was transformed into a W303 strain of yeast following a standard heat-shock procedure. The transformed yeast were then plated on SC-TRP

<sup>47</sup> “The Methods of Identification, Analysis, and Removal of Endocrine Disrupting Compounds (EDCs) in Water.” *ResearchGate*. [https://www.researchgate.net/publication/26695889\\_The\\_methods\\_of\\_identification\\_analysis\\_and\\_removal\\_of\\_endocrine\\_disrupting\\_compounds\\_EDCs\\_in\\_water](https://www.researchgate.net/publication/26695889_The_methods_of_identification_analysis_and_removal_of_endocrine_disrupting_compounds_EDCs_in_water).

<sup>48</sup> Miller, Charles A., Xiaobing Tan, Mark Wilson, Sunanda Bhattacharyya, and Sara Ludwig. “Single Plasmids Expressing Human Steroid Hormone Receptors and a Reporter Gene for Use in Yeast Signaling Assays.” *Plasmid* 63, no. 2 (March 2010): 73. doi:10.1016/j.plasmid.2009.11.003.



(synthetic complete minus tryptophan) plates as a selection factor since yeast are auxotrophic, meaning they need all essential amino acids to grow. The engineered plasmid containing human estrogen receptor allows the YES YEAST to grow without tryptophan. After about three days of incubation, the transformed YES yeast were tested for their estrogen biosensing. For this process, the assay, I followed the Nature protocol “Detecting ligands and dissecting nuclear receptor-signaling pathways using recombinant strains of the yeast *Saccharomyces cerevisiae*” (2010) by Fox et al<sup>49</sup>.

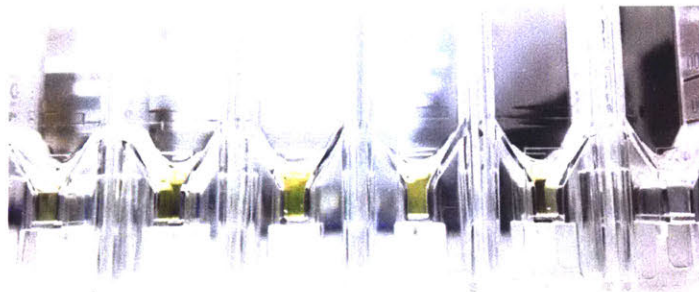


**Image of plasmid construct (left). First generation competent YES-HER yeast cells imaged under a microscope in Vanessa’s lab (right).**

Please refer to Appendix 1 for an illustrated overview of the protocol. On the first day, a colony of yeast were swabbed and mixed into a liquid culture of SC-TRP and incubated overnight at 30°C. On day 2, the competent yeast cells were diluted 100 fold. Then the following estrogen dilutions were made from an estradiol stock purchased from sigma Aldrich: 0.1X, 1X, 10X, 100X, and 1000X. These dilutions were then incubated overnight with the yeast at 30°C for 18 hours, allowing time for the estradiol molecule to freely pass across the cell membranes. As this occurs, the estrogenic molecules signals the cell to begin producing an enzyme called beta-galactosidase. The amount of enzyme produced should correlate to the amount of estrogen binding to the human estrogen receptor engineered into the yeast. Finally on the third day, the cell density was measured using a spectrophotometer as this factor affects the readout of the biosensing. The yeast cells were then lysed open using a Z buffer solution simultaneously added with *ortho*-Nitrophenyl- $\beta$ -galactoside (ONPG), a substrate which when catalyzed by beta-galactosidase produced a yellow-colored nitrophenol product. About 30 minutes after the lysing under 37°C, a yellow color started to appear. The color intensity was then measured with a colorimeter, and that data was used with the cell density data to quantify the amount of estrogen detected in the sample.

<sup>49</sup> Fox, Jennifer E., Matthew E. Burow, John A. McLachlan, and Charles A. Miller. “Detecting Ligands and Dissecting Nuclear Receptor-Signaling Pathways Using Recombinant Strains of the Yeast *Saccharomyces Cerevisiae*.” *Nature Protocols* 3, no. 4 (March 2008): 637–45. doi:10.1038/nprot.2008.33.

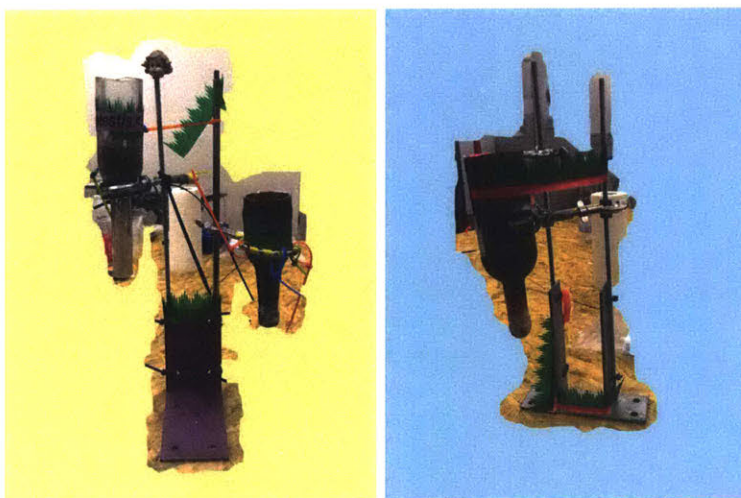




**YES-HER Yeast color change after exposure to estradiol at serial dilutions.**

## **DIY Column Chromatography Urine Extraction Action**

“Urine-Hormone-Extraction-Action” was first conceived at a collaborative residency in Madrid’s Medialab-Prado called Interactivos’16: Possible Worlds<sup>50</sup> with Byron Rich (artist), Paula Pin<sup>51</sup> (Transhackfeminist, Gynepunk Lab), and Gaia Leandra (autonomous). Further prototyping was developed with Slovenian bioartist Spela Petric<sup>52</sup> (Hackteria), and we also received consultation from Hackteria members Marc Duszagr, Sachiko Kana, and Rudiger Trojok.



**An angle bracket design (left). A U-post bracket design (right)**

Column chromatography is a method of separating compounds based on their chemical structure and polarity by creating a “stationary phase” and a “mobile phase” inside a long glass column. For urine hormone separation, laboratories typically use C18 cartridges for the isolation of the urine analytes;

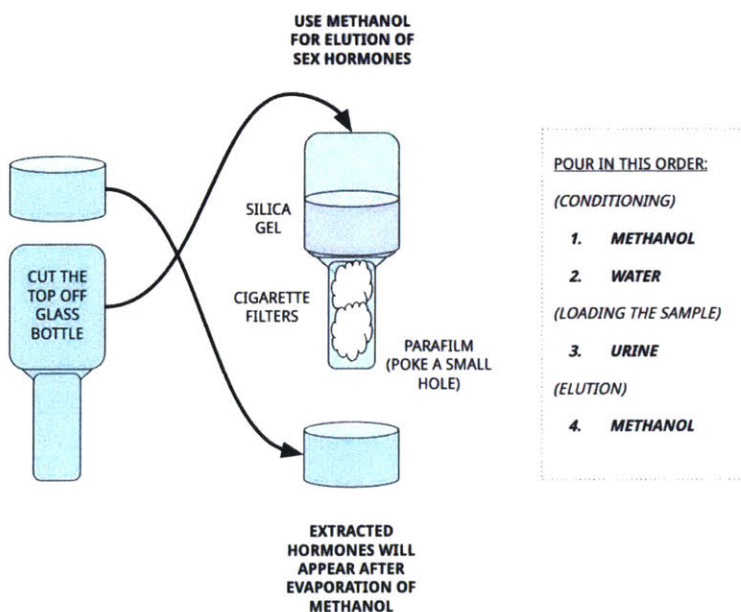
<sup>50</sup> “Interactivos’16: Possible Worlds. Creative and Collaborative Uses of Digital Technologies Workshop- Interviews Timetable | Medialabcomunidad.” <http://comunidad.medialab-prado.es/es/post/interactivos-16-possible-worlds-creative-and-collaborative-uses-digital-technologies-workshop>.

<sup>51</sup> “En Deconstruccion.” <https://jellypin.hotglue.me/>.

<sup>52</sup> “Špela Petrič – Life in the Terratope.” <http://www.spelapetric.org/>.

however these cartridges can only be ordered through chemical supply companies and usually in bulk (>200 count) even though individually, they cost in the range of \$1-4. By accident, we researched the chemical composition of cigarette filters and found they are largely consisted of cellulose acetate, a common nonpolar binding substrate. This became the main “stationary phase” of the chromatography experiment to which the hormones would bind. A layer of silica gel, an extremely hydrophilic polar substrate, is also added to the column for separating components of urine in which we are not interested. As for the “mobile phase,” several laboratory protocols described methanol (elution strength  $\epsilon^\circ 0.95$ ) as the most effective eluent for steroid hormones. Methanol proved to be the most inaccessible and challenging ingredient of this extraction experiment since its consumer availability varies on the country, and because it is a flammable and hazardous substance.

As for the hardware component of the experiment, typical laboratory columns can run in the range of \$200-600. At the Madrid residency, we decided instead to use recycled glass bottles and cut the bottoms off. The column stand for holding the glass bottles was prototyped at an event later after Madrid residency called PIFcamp: Alpine Hacktivation<sup>53</sup> in Soca Valley, Slovenia, a mountainous region of lush forests and glacial river water. The limited hardware availability in this setting prompted the use of shelf brackets, metal rods, and zip ties for the fabrication of a column chromatography lab setup for under \$10.



**Image of experiment schematic.** A DIY column is constructed by cutting the bottom off a glass bottle. The column is packed with cigarette filters then silica gel, creating a highly nonpolar and polar environment, respectively.

<sup>53</sup>“2016\_Alpine Hacktivation.” *PIFcamp*. [http://pif.camp/2016\\_alpine-hacktivation/](http://pif.camp/2016_alpine-hacktivation/).

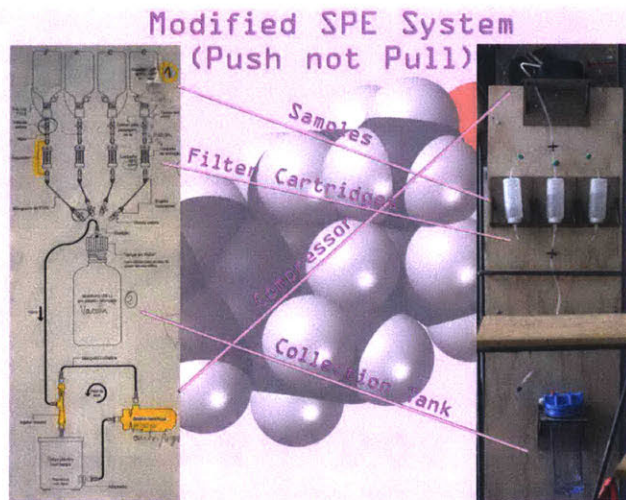
Once the column has been constructed, the experiment proceeds with four main steps: condition the column with methanol, and then water, then load the urine sample, and finally elute the hormones off the cigarette filters with methanol again. The methanol is then evaporated off using a hot water bath and an air pump. This typically requires one or two hours to fully evaporate, leaving behind a brown sticky substance which is a collection of all steroid-like molecules (to isolate only estrogen is beyond the scope of this protocol).



Image of hormones after methanol evaporation

### River Gynecology Xeno Waters S-P-Extraction

Like "Urine-Hormone-Extraction-Action," the solid phase extraction (SPE) protocol was also developed at the Interactivos residency at Medialab-Prado alongside Byron Rich, Paula Pin, and Gaia Leandra. We wanted to test public water samples such as river and fountain water using the YES-HER system of detection. However, organic pollutants in water tend to be extremely dilute and are usually accompanied by microbes and other particles which should be filtered out of the water before incubating with the YES yeast. Therefore, the water sample must undergo a SPE step as a sample preparation method.



Our SPE system modified from Sodre et al 2009 created at Medialab-Prado (Madrid).

We based most of our initial experiments on a Portuguese study (Sodre et al, 2009)<sup>54</sup> which had used the BLYES system of detection for river pollution in Brazil. They had constructed a relatively low-cost SPE system (about \$360) with basic hardware that used laboratory standard C18 cartridges. We decided to “hack” this schematic and create an even cheaper system for under \$60 using cigarette filters instead of the C18 cartridges.



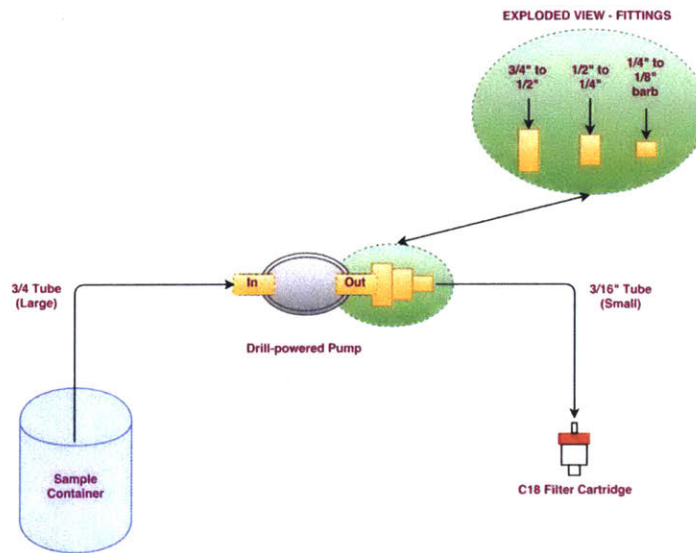
**Open Source Estrogen installed at the Interactivos'16?: Possible Worlds exhibition**

The final SPE construction was made during the residency at Coalesce Center for Biological Art<sup>55</sup> with the help of Solon Morse and Byron Rich. This improvement reduces the leaking of the previous system and replaces the air pump with a drill powered pump. After running the solid phase extraction, the hormones will be trapped inside the filters which you would then need to elute with methanol. Methanol must evaporate before running detection with YES-yeast. The organic pollutants can be redissolved in DMSO which is safe for the yeast.

<sup>54</sup> “An in-Line Clean System for the Solid-Phase Extraction of Emerging Contaminants in Natural Waters.” *ResearchGate*.[https://www.researchgate.net/publication/280041940\\_An\\_in-line\\_clean\\_system\\_for\\_the\\_solid-phase\\_extraction\\_of\\_emerging\\_contaminants\\_in\\_natural\\_waters](https://www.researchgate.net/publication/280041940_An_in-line_clean_system_for_the_solid-phase_extraction_of_emerging_contaminants_in_natural_waters).

<sup>55</sup> “Coalesce Center for Biological Art.” *UB Department of Art*, January 21, 2016. <http://art.buffalo.edu/about/coalesce-center/>.

## SOLID PHASE EXTRACTION - ASSEMBLY DIAGRAM



**Final SPE design.** It uses a drill pump mechanism to siphon your water sample through a C18 column, which cost around \$3 from lab supply companies.

### Estrofem! Workshopology Surveys

The workshopologies in 2016 can be characterized as collaborative prototyping with the public, and the ones following in 2017 were conducted with a finalized protocol as a result from the previous iterative process. A total of 40 workshop surveys were completed from five workshops in 2017 which followed finalized protocols. Three of the workshops (CKSTER<sup>56</sup> Switzerland, University of Puget Sound, and Double Union<sup>57</sup> San Francisco) focused on the "Urine-Hormone-Extraction-Action" protocol, one (Arizona Festival of DIY Cultures) in combination with "YES-HER Yeast Biosensors: Does it say yes to her?" and one (Squeaky Wheel Film and Media Art Center<sup>58</sup> Buffalo) combining "YES-HER Yeast" with "River Gynecology Xeno-Waters S-P-Extraction."

<sup>56</sup> "Ckster: Gender Hacking." *Ckster*. <https://ckster.org/>.

<sup>57</sup> "Double Union | A Hacker/maker Space for Women in San Francisco." <https://doubleunion.org/>.

<sup>58</sup> "Squeaky Wheel Film & Media Art Center." *Squeaky Wheel Film & Media Art Center*. <http://www.squeaky.org/>.

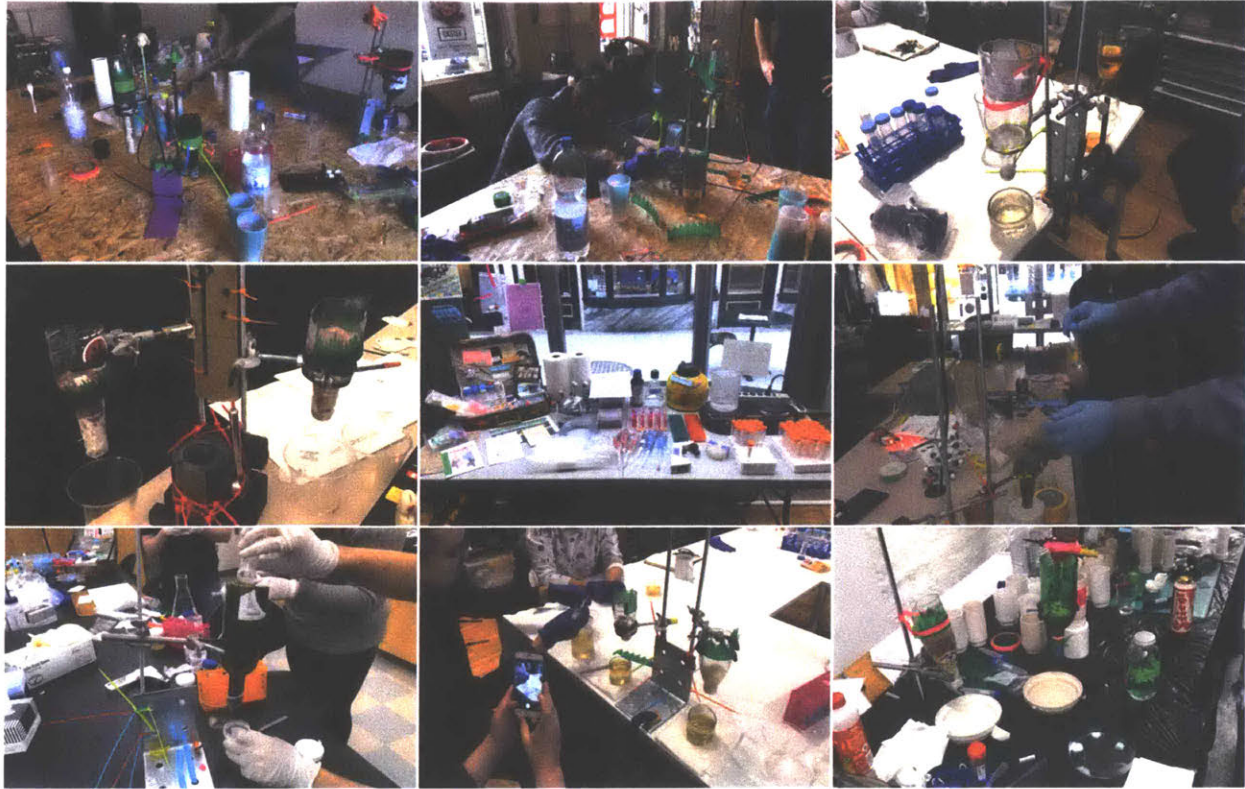


### Estrogen Geeking and Workshopology in 2016

Time	Event	Location
May 2016	International Symposium on Electronic Arts (ISEA)	Hong Kong
May 2016	Art Meets Radical Openness: Wasted!	Linz, Austria
June 2016	Interactivos? 16: Possible Worlds	Madrid, Spain
July 2016	Border Sessions: Festival on Technology & Society	The Hague, Netherlands
August 2016	Hackers on Planet Earth (HOPE) XI	New York City
August 2016	PIF Camp 2016	Trenta, Slovenia
September 2016	Ars Electronica Festival	Linz, Austria
October 2016	ForumCAMP: Aliens in Green	Nantes, France
November 2016	Piksel16 Zero Level	Bergen, Norway
February 2017	Transmediale: Alien Matter	Berlin, Germany
March 2017	CKSTER Gender Hacking Festival	Berne, Switzerland
March 2017	Squeaky Wheel	Buffalo, NY
April 2017	Arizona Festival of DIY Cultures	Phoenix, AZ
April 2017	University of Puget Sound	Tacoma, WA
April 2017	Double Union Hackerspace	San Francisco, CA
April 2017	Nature Animee #2	Vienna, Austria

**Total List of Estrofem! Workshopologies 2016-17.** Highlighted events had participants fill out a workshop survey.





### Estrogen Geeking and Workshopology in 2017

#### Survey Questions\*

1. Why did you join this workshop?
2. Do you have a prior experience with BIOHACKING/DIY/DIWO SCIENCE? If yes, please explain.
3. What did you find MOST INTERESTING about the workshop?
4. What did you find MOST BORING about the workshop?
5. What is something you learned that you didn't know before?
6. Would you like to ask something to me? Please write.
7. How was the balance between conceptual and technical knowledge?
8. How do you perceive HORMONES now and why?
9. What were your expectations of the workshop prior and after?
10. How feasible is to replicate the recipes you learned today? Are you going to try it?
11. How do you think the workshop can IMPROVE?

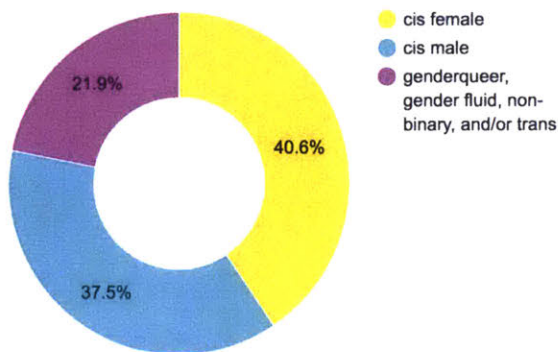
\*Please refer to Appendix 3 for the full workshop survey.

In addition to the 11 questions listed, I also took participant data on their background and professions, and how they identify, referring to the list of gender identity options given by Facebook in 2013. After reviewing all 40 completed workshop surveys, I decided to focus on the answers to questions

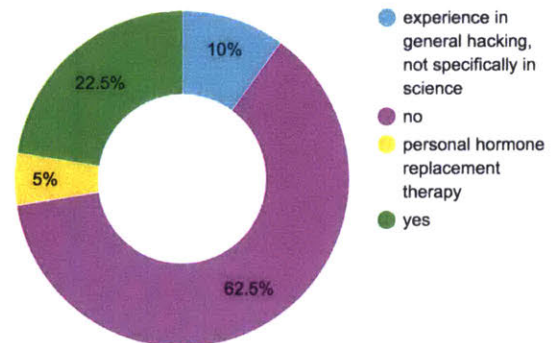
2, 3, 5, and 10 since they gave the most “meaningful” feedback on the workshop experience. Although most of the responses were more qualitative than quantitative, I tried to define three to six parameters that I could group the subjectivities into by observing the most frequent categories of responses. (This method necessarily imposed generalizations of the participant responses). I then created pie charts representing the empirical data. It’s also important to note that two of the workshops were academically sponsored and advertised (University of Puget Sound and Squeaky Wheel in Buffalo), two were part of publicly-hosted festivals (CKSTER Festival and Arizona Festival of DIY Cultures), and one was hosted by a feminist hackerspace (Double Union).

These are my main observations: The gender identity balance was quite good. Most participants did not have any experience in biohacking. Most of them were students, or came from an art/design/performance background. Most were surprised to learn about the ubiquity of hormonal molecules in the environment and their potential to queer our bodies and bodies of non-human species. Participants leaned more towards the conceptual framework in relation to the biotechnical knowledge. And finally, most participants would replicate the experiment again on their own; some would require more direction or doing with others, and some would if resources like methanol and silica gel were more readily available.

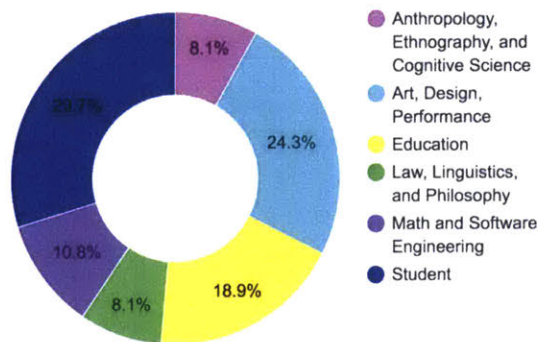
*Gender Identity of Participants*



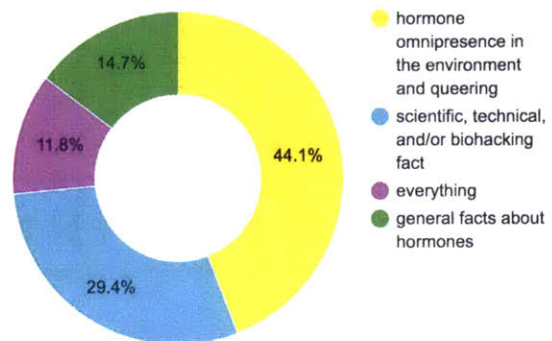
*Experience in Biohacking?*



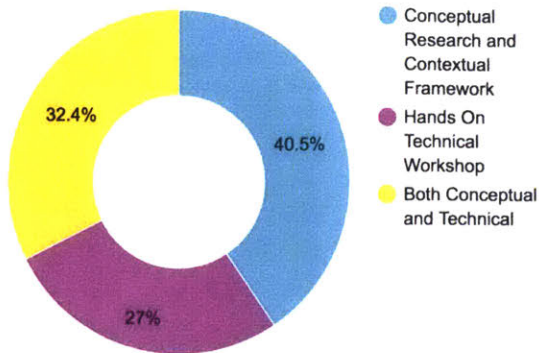
*Background and Professions*



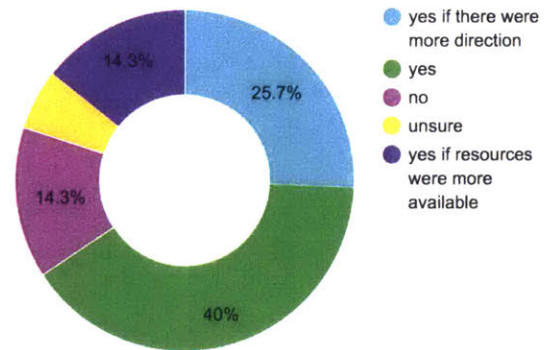
*What They Didn't Know Before*



*Most Interesting for Participants*



*Would You Replicate It Yourself?*

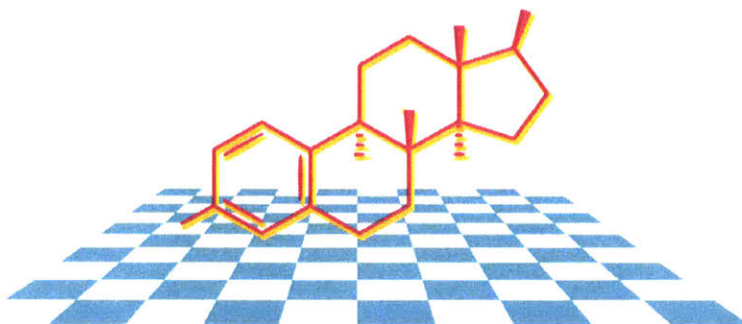


Selected responses from question 8:

- ★ "Hormones are so interesting, people either overstate/oversimplify their effects or not consider them at all."
- ★ "I find hormones as something that can help or harm"
- ★ "I see hormones as a more inclusive and broad part of my life as a human rather than just a pharma word/tool."
- ★ "I identify as queer and I'm currently exploring what gender is, how it's perceived, and what aspects of gender are important to me. I was attracted to the phrase 'queering of our bodies' and related various levels of hormones on a biological level are just a binary. I love stuff that affirms/celebrates non-binary gender."
- ★ "I find this conflict between toxicity and the positive nature of queerness super fascinating"

## PART II: HOUSEWIVES MAKING DRUGS

### OPEN SOURCE ESTROGEN HOUSEWIVES MAKING DRUGS



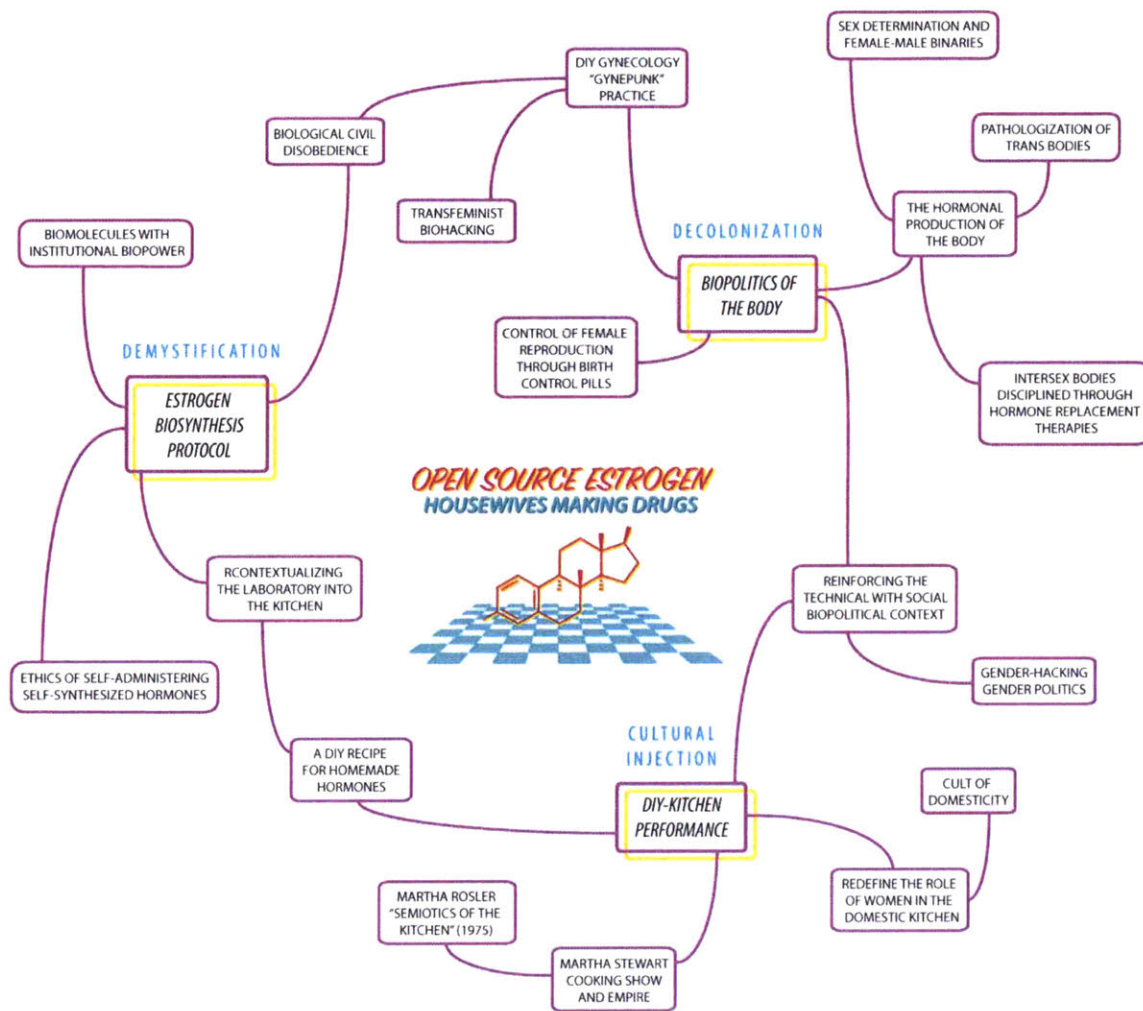
Although *Open Source Estrogen* was first conceived with the idea of making hormones in the kitchen, it was important to first generate estrogen hacking protocols through the *Estrofem! Lab* in order to explore the limits of possibility for such a speculative scenario. Of the three “recipes” of *Estrofem! Lab*, I chose the “Urine-Hormone-Extraction-Action” protocol to be the one contextualized in a subversive Martha Stewart cooking show style. I also chose to focus on the narrative of gender transition and the issue of access and medical discrimination that many trans folks experience in the process. The “housewives” would be transwomen who both defy the female domestic normative as well as become the producers of their own gender transitions, in combination, generating an alternative reality which subverts dominant patriarchal institutions of hormonal control.

#### **Kitchen-Laboratory Subversion**

The kitchen is a politically charged space prescribed to women as their proper dwelling, a notion first popularized in an ideological text from the early 1800s called the “Cult of Domesticity<sup>59</sup>” or “Cult of True Womanhood.” Then beginning in the 1950s, companies began to massively market kitchen appliances to women, claiming to reduce the menial tasks performed in the kitchen but actually affirming women’s place in the domestic sphere. By recontextualizing the kitchen as a place where laboratory science could be performed, not only are scientific protocols demystified and decoupled from their patriarchal black box, it subverts the kitchen as a typified female space. Furthermore, when the repurposed kitchen is used to create hormonal contraceptives or hormone therapies comprised of

<sup>59</sup> Welter, Barbara (1966). “The Cult of True Womanhood: 1820–1860.” *American Quarterly*. 18 (2): 151–174.

estrogen, the kitchen housewife hacker reclaims their body and gains greater endocrinological know-how and body/gender sovereignty by circumventing governments and institutions. This hybrid kitchen-laboratory space serves as a gender-hacking space, hacking not only biology through hormonal implementation, but also reclaiming the typified notions of sex and gender.



**Mind Map for Housewives Making Drugs show concept.** Last edit made on April 2017.

This speculative scenario asks, what if there was an open source protocol for synthesizing estrogen, performable in any standard kitchen? And if this were possible, what are the ethics behind self-administering self-synthesized hormones? These types of questions aren't meant to be answered by any kind of scientific solutionism. Instead, they demand imagination and new subjective experiences. Using speculative design as tactical tool for subversion, *Open Source Estrogen: Housewives Making Drugs* creates a narrative where a transwomen stars host a famous cooking show that teaches the audience at home how to extract estrogens from their urine. The urinary estrogens are then purified and recycled



back into the body, becoming a “natural” open source recipe for upkeeping one’s gender transformation. The cooking show is sarcastically called *Housewives Making Drugs*, where Martha Stewart meets Martha Rosler’s 1979 “Semiotics of the Kitchen”<sup>60</sup>.

### Pre-production and Script Writing

My collaborators for the project are Orgasmic Creative production team members Mango Chijo Tree and Jesse Franklin, and transfemme artists Jade Phoenix and Jade Renegade. I was inspired by Orgasmic Creative’s previous projects with Japanese “pussy artist” Rokudenashiko<sup>61</sup> (famous for canoe out of the 3D scan of her vagina) on the cultural taboo around the vagina and the artist’s trial with the Japanese government for “public obscenity.” In one of their video collaborations, the film<sup>62</sup> and its editing style took this cultural taboo into the absolute absurd, critiquing the Japanese norms that forbid the free expression of the female body. Next, I met Jade Phoenix<sup>63</sup> during one of her spoken-word performances at EMW Bookstore<sup>64</sup> in Cambridge, MA. I was immediately blown away by her energy and her intersectional politics, being that she is a queer trans Filipinx parent. Jade then recruited her friend and fellow performance artist Jade Renegade to develop the cooking show’s script and dialogue as well as act alongside her. Mango Chijo Tree, Jesse “The Jayder” Franklin, Jade Phoenix, and Jade Renegade all had a huge part in the film’s style, identity, and final outcome, and I owe the completion and success of the project to these four amazing, talented individuals.



Official cooking show logo.

<sup>60</sup> “Martha Rosler. Semiotics of the Kitchen. 1975 | MoMA.” *The Museum of Modern Art*. <https://www.moma.org/collection/works/88937>.

<sup>61</sup> Kikuchi, Daisuke. “‘Vagina Artist’ Megumi Igarashi Continues Her Battle with Japan’s Definition of Obscenity.” *The Japan Times Online*, April 18, 2017. <http://www.japantimes.co.jp/news/2017/04/18/national/vagina-artist-megumi-igarashi-continues-her-battle-with-japans-definition-of-obscenity/>.

<sup>62</sup> Orgasmic Creative. [Rokudenashiko Trial Movie] *ワイセツの意味がおかしくなった世界*. <https://www.youtube.com/watch?v=7adi2e1KE0I>.

<sup>63</sup> “Home.” *Jade Phoenix*. <http://www.jadephoenixpoetry.com/>.

<sup>64</sup> “About.” *EMW Bookstore*. <http://www.emwbookstore.com/about/>.

### Show Synopsis and Structure:

What if it were possible to synthesize hormones in the kitchen? Imagine if this was as easy and simple as cooking a meal. "Housewives Making Drugs" is a fictional cooking show where the trans-femme stars, Jade and Jade teach the audience at home step-by-step how to cook their own hormones. They perform a simple "urine-hormone extraction recipe" while amusing the audience with their witty back-and-forth banter about body and gender politics, institutional access to hormones, and everything problematic with heteronormativity. Choosing the kitchen as the appropriate battleground for tackling body/gender politics and institutional access, the cooking show aims to challenge/subvert patriarchal society and speculate on a world with greater body sovereignty for all.

The cooking show is broken up into four acts. These four acts are meant to stand alone as separate videos which will be strung together into a YouTube channel mini-series.

- **Act I (Phoenix and Renegade):** Jade Phoenix arrives and Jade Renegade's house only to find that her health care has been cut due to new Trump administration. They have some beers and start to ponder on ways to get hormone access without needing a doctor's prescription.
- **Act II (Housewives Making Drugs):** The Housewives Making Drugs cooking show opens to Jade and Jade dressed as retro housewives on a colorful decorative set, the studio audience cheering wildly. They explain that on today's episode, they will show how to make homemade estrogen using a biohacking method called "The Estrofemminizer."
- **Act III (Ur-ine Luck):** The act opens to Jade Phoenix on a toilet break, revealed later that her urine is the main ingredient for the homemade estrogen recipe. Jade and Jade continue to instruct the viewers how to extract the hormones from the urine, purifying them so that they are safe to ingest later. The scene fades out to a commercial break of "Essence of Estrogen."
- **Act IV (Estro-gin!):** The estrogen extraction is finished, and now they can be ingested through dissolving them in hard liquor. Before the estrogen shots are made, Jade Phoenix walks us through an ethical reflection on self-administering homemade hormones. Then Jade and Jade serve up the "Estro-gin" shots, and members of the studio audience join on the stage, dancing to an "Estro-gin Song" that magically starts to play in the background.

### Sample of Housewives Making Drugs Script, Act II\*:

SCENE: (Theme music playing) Kitchen show setting, cold open to both

PX and RG in front of kitchen island

BOTH: Hello and welcome to our show!

PX: I'm Maria

RG: And I'm Maria

PX: And we are...

BOTH: Housewives Making DRUGS!!!

(Shots to Audience cheering)

(Show LOGO flashes on screen)

PX: On today's show, maria and I are going to show you viewers at home how to get hormones without needing that pesky doctor's prescription.

RG: That's right Maria! We've concocted a recipe where we can reuse estrogen expelled from our bodies!

(Cut to audience close up reaction wowing)

PX: So you're saying this recipe would allow us to circumvent the whole medical industrial complex???

RG: And increase access for trans women to gain radical body autonomy,

PX: by sharing hormones and tapping into new systems of interdependent community -

RG: all while taking the phrase "sharing is caring" to a whole new level!

PX: WOW! And what do we need to make all this happen?

RG: This ladies, gentlemen, non binary, agender, and gender-non-conforming folks, is the "The Estrofeminizer!!!"

(RG brings out the extraction column)

(audience says WOW)

PX: The only tool a real estrogen hacker needs, to do her deeds.

RG: The best part is all these ingredients are cheap and easy-to-find.

PX: Just how I like my men.

(audience laughter)

RG: It's made up of silica gel and cigarette filters layered inside a modified glass bottle.

*(text popping up on screen)*

*(close up pan bottom to up on column)*

PX: I found these items after a heavy night of drinking and smoking.

*(cut to audience laughter)*

RG (front on): Nevermind that over-priced laboratory equipment, this is a DIY contraption for all you biohackers out there.

PX: Whoa whoa hold up "biohacking"??? That sounds scary.

(Text pops on screen "BIOHACKING???)

RG: Well no, think of it as something as simple as making cheese or wine and beer.

PX: OHHH SO Maria, WE HAVE ALWAYS BEEN BIOHACKERS?!!



(cut to audience going ohhhhhhhhhhhhhhhhh)

RG: EXACTLY Maria! Okay, to get started all we need is one more very special ingredient.

PX: And we will tell you, right after a quick but essential break!

(show's theme song starts playing)

(cut to audience cheering)

FADE TO BLACK

\*Please refer to Appendix 3 for the full script of *Housewives Making Drugs*.

The script was co-written by myself, Jade Phoenix, and Jade Renegade. While I contributed the main biohacking protocol for “The Estrofemminizer” homemade estrogen recipe, Jade and Jade contributed their own personal experiences with gender transition and institutional roadblocks, and wrote many of the jokes and banter that they themselves would say together as friends hanging out casually. I personally wanted to give them as much authority as possible over the script, giving them ownership over the script so they can deliver lines that they are comfortable with and are aligned with their own personal politics.

## Filming and Post-production

### Location and Set Design

We filmed in Los Angeles where the actresses Jade and Jade live, and where we can easily access resources for film production such as renting location and filming equipment. The location was selected through the AirBnB website listed by a homeowner who actually works as a professional chef and caterer from her own kitchen. The set design was co-created by myself and Mango using elements from the *Estrofem! Lab* workshopology project as well as materials bought from Daiso, a Japanese 99-cent store.



Film location in Los Angeles.

### Filming

We had a total of three camera angles: front-on, three-quarters side, and free-hand. Mango, Jesse, and I took turns operating the cameras with the help of Vince Rabaja, who also helped with the sound captured on a boom microphone. We filmed the opening scene at Jade Renegade’s house and the

all of the kitchen scenes in one 10-hour day at the AirBnB location. The studio audience included myself and extras who were friends of Jade Phoenix (Audrey Mercado Ortiz, Christine Wang, Phyl Etiene Johnson, Vince Rabaja).



**Video Still from the Housewives Making Drugs film, Act IV “Estro-Gin!”**

### Estro-Gin Song and Dance

In the last Act IV, an “Estro-gin” song appears magically in the background, prompting the stars Maria and Maria to begin dancing and offer up shots to the audience who also join on stage. This scene especially works to demystify DIY hormone replacement therapy through a catchy theme song and collective gin shot party. The song lyrics, music, and choreography was created by Mango Chijo Tree from Orgasmic Creative.

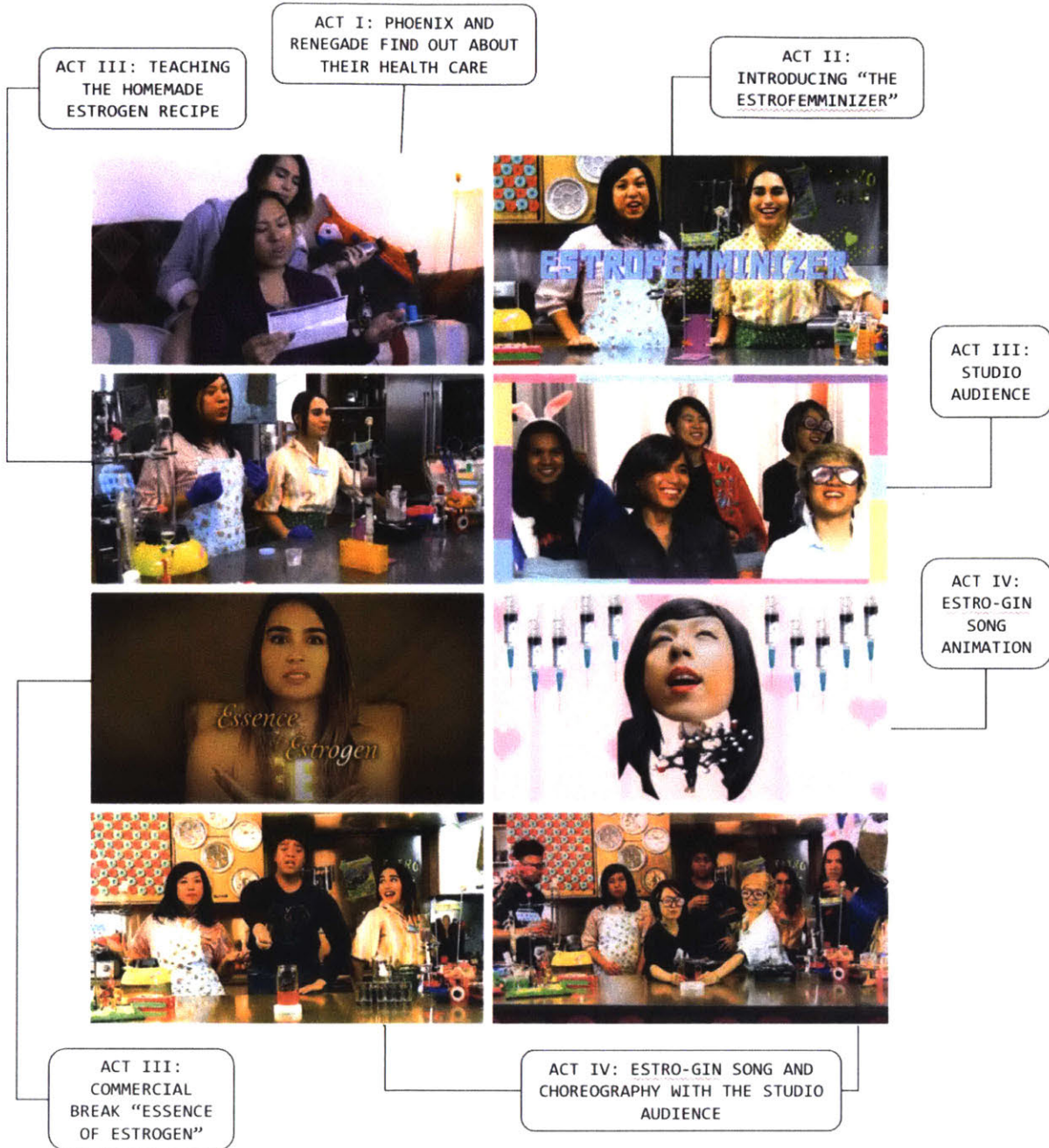
“Es- tro- gin  
Es- tro- gin  
Es- tro- gin  
We make ‘mones!

Es- tro- gin  
Es- tro- gin  
Es- tro- gin  
We take ‘mones!

Dr- dr- dr- drink!  
Dr- dr- dr- drink!  
Dr- dr- dr- drink!

We take ‘mones -Ow!”

Editing and Post-Production

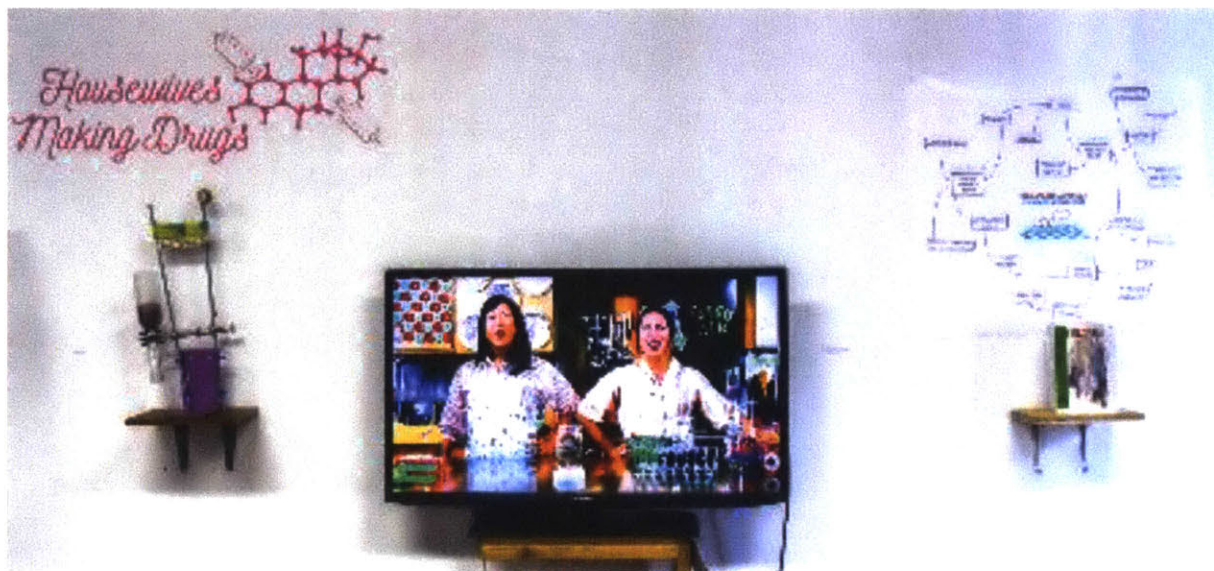


**Various stills selected from the film and their descriptions.**

During the post-production phase, I was responsible for the main shot selections which stayed true to the script. Orgasmic Creative produced many of the special effects such as logo and text animations and commercial effects. We both worked together on sound and color correction. The opening song in Act I and background music was produced by music artist Leah Ann Mitchell. The film is

also structured so that it can stand alone as a whole 10 minute film as well as be broken up into four parts of equal length. We plan to create a YouTube channel mini-series from these four parts.

## Public Exhibitions



**Housewives Making Drugs installation, Culturalizing Science @ EMW Bookstore**

*Housewives Making Drugs* was exhibited at a group show called *Culturalizing Science*, hosted by the EMW Bookstore in Cambridge, Massachusetts. The show opened on April 6th, 2017 to a diverse audience who were all very receptive to the film's humour, style, and focus on transpolitics. Additionally through an open call, *Housewives Making Drugs* was selected to show in the *Transitional States: Hormones at the Crossroads of Art and Science*<sup>65</sup> international video art exhibition and public engagement program, and will be premiering at Project Space Plus (Lincoln, 1-28 February 2018), Peltz Gallery (London, 10 May-11 June 2018), Centre de Cultura Contemporània de Barcelona (Barcelona, Autumn 2018), and Sala Borsa (TBC, Bologna, Autumn 2018). The film will also be translated to Japanese, Spanish, and Italian.



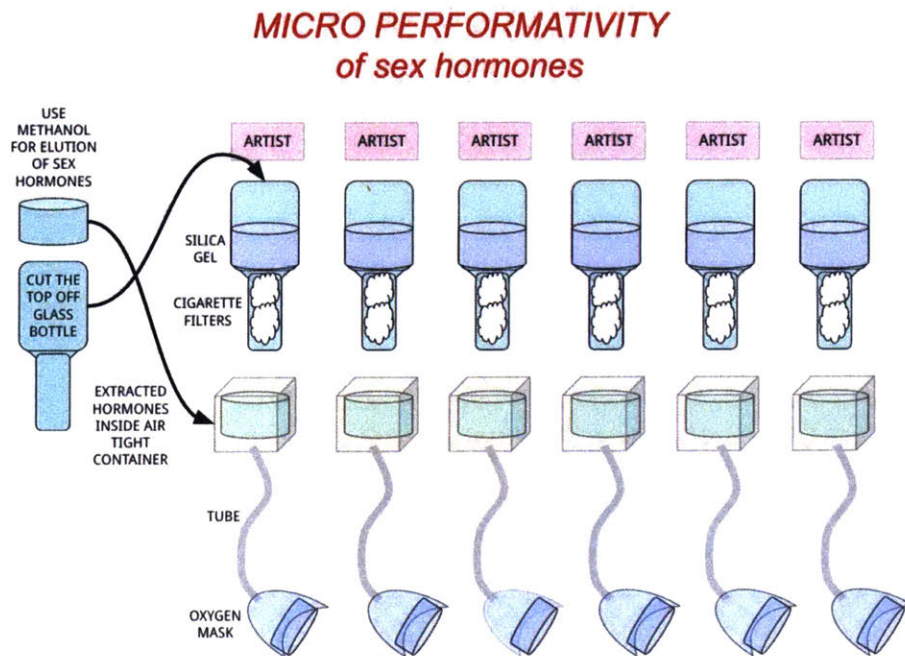
**Opening night of Culturalizing Science at EMW Bookstore.**

<sup>65</sup> "Transitional States." <http://transitionalstates.com/>.

## PART III: HORMONE MICRO PERFORMANCE

This section describes different iterations of *Open Source Estrogen* born out of the hormone hacking protocols of *Estrofem! Lab*, collaborative performances with other artists, and interactions with the public. The first (*Micro Performativity of Sex Hormones*<sup>66</sup>) explores the bio-performativity of hormones in a series of hormonal shrines that invite the audience to smell and be colonized. The next two pieces (*Molecular Queering Agency* and *Aliens in Green: Xenopolitics #1*) incorporate a highly orchestrated, theater tactics to focus on the pervasiveness of hormonal molecules in our environment, and how we can develop new discourses and subjectivities for living with toxicities. From hormonal shrines to urine fountains to fictional agencies which act on behalf of the estrogen molecule, these projects attempt to manufacture new subjectivities for a willing audience, to invite others to embrace the unruly, micro-colonial presence of xeno-molecules.

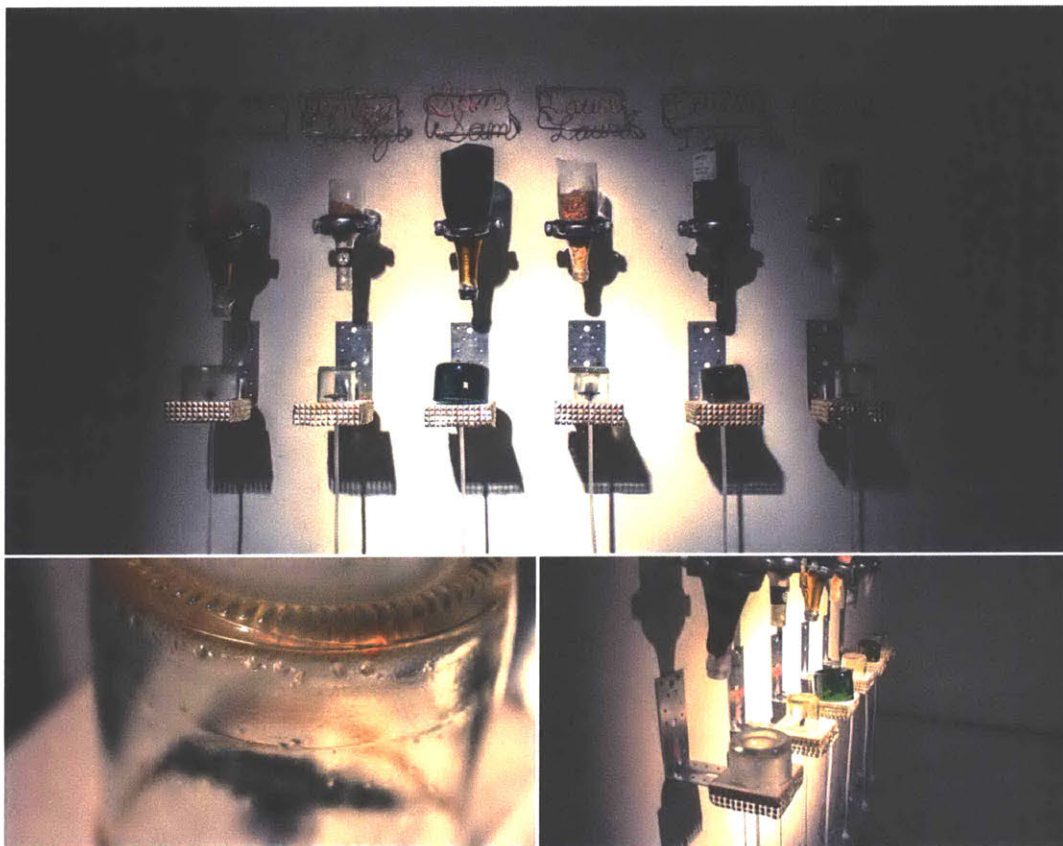
### **Micro Performativity of Sex Hormones (2016)**



Schematic of hormonal shrines for group exhibition, *Interacting Art*.

<sup>66</sup> "Micro Performativity of Sex Hormones (2016) - M.A.G.G.I.C." <http://maggic.ooo/Micro-Performativity-of-Sex-Hormones-2016>.

Through an open call for a group exhibition *Interacting Art*<sup>67</sup> at Raumschiff Gallery, a participating show at the Ars Electronica festival (Linz, Austria) in September 2016, *Micro Performativity of Sex Hormones* uses the "Urine-Hormone-Extraction-Action" protocol to create "hormone portraits" of the other artists in the show. I approached each artist asking them for a urine sample so that I could extract their hormones and put them on display. I also informed them that the hormone samples will *not* be anonymous and would be connected to oxygen masks, allowing the audience to smell and partake in the hormone experience. Almost all of the artists reacted with discomfort, mainly at the thought that the smell of their urinary hormones would repulse members of the public. Hormones, when extracted from the urine, continue to act outside the body as chemically-signaling pheromones. From my experience, the olfactory reaction to urinary hormones actually differs from person to person because everybody has a different composition of receptors in the nose. Smell being the least understood of the five senses, there isn't enough consistency in scientific data to explain the effects (neurological, psychological, behavioral) of urinary hormones in humans. However, we can still speculate that the inhalation of the pheromones initiates a "micro-colonization" of the mind that is both ancient and evolutionary, a chemical signaling that spans all animal taxa.



**Image of hormonal shrines on exhibition at Raumschiff Gallery**

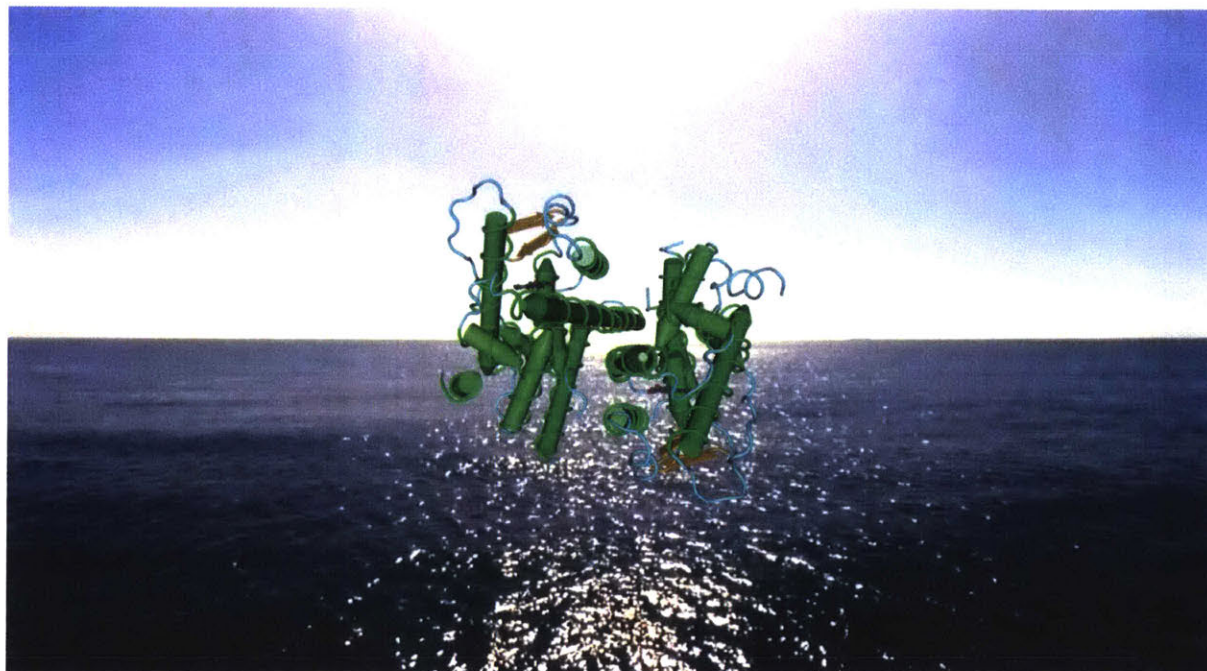
<sup>67</sup> "RAUMSCHIFF: Interacting Art." *Radical Atoms*, August 1, 2016. <https://www.aec.at/radicalatoms/en/raumschiff/>.

Also embedded in *Micro Performativity of Sex Hormones* was a narrative of the experimental process. Who was the nomadic biohacker searching for a new hormone intimacy, experimenting in a dank, dark dungeon somewhere in Linz? Showing the aftermath of urine-hormone extraction, the hormonal shrines situated themselves next to the “freak-science” open lab process from which they originate, displaying the *Estrofem! Lab* nomadic suitcases filled with all the materials, samples, and chemicals customized to the artist’s biohacking style and personal methodology. Revealing the experimental process not only demystifies the scientific method but also demonstrates that process is just as significant as final result. The open lab installation of *Estrofem! Lab* suitcases also reject the sterility and purity of both the laboratory space and the gallery “white-box.” The open lab installation shows biology and biochemistry for what it is: messy, uncontrollable, and open for mutations and subjectivities outside of institutional access and normalization.



Images from the open lab part of the *Micro Performativity* installation at Raumschiff Gallery.

## *Molecular Queering Agency* (2016)



Video still from the *Molecular Queering Agency* animation.

The *Molecular Queering Agency* is a fictional service that acts on behalf of the xeno-molecules pervading our environments, and attempts to refigure our toxic world. It urges its participants not to react with sex panic, but to acknowledge our bodies as permeable, changeable mediums that invite mutation from a queering landscape. This is a collective queering experience which we share with all species, with whom we share the same hormone receptors. As these xeno-molecules unintentionally partake in a semiosis with our receptors, this agency attempts to translate that semiotic process into a language that humans can understand, offering gentle guidance through the process of queering and creating new subjectivities for living in an increasingly alien world. This audio/visual experience consists of a large-scale immersive projection of an animation<sup>68</sup> paired with a computer-generated voice which reads from the agency's script. The script is formulated from a three-step process for guiding participants from a crisis in the body to acceptance of our intoxicated world:

1. **Toxicities:** You live in an alien landscape filled with toxicities. This creates a “crisis of the body” that elicits anxiety and phobia over gender ambiguity, intersexuality, and threats to reproductive futurism.

<sup>68</sup> maggic. *Molecular Queering Agency* v.1, 2016. <https://vimeo.com/197290348>.



2. **Semiosis:** You are already alien. These xeno- molecules, though foreign and strange, communicate and signal to the receptors in our bodies and transfect a change that makes sense only through a span of evolutionary time.
3. **Subjectivities:** Do you want to be more alien than you already are? Do you accept our queer future?

## PROMISES OF SIGNIFICANT OTHERNESS

### 1. TOXICITIES - YOU LIVE IN AN ALIEN LANDSCAPE

### 2. SEMIOSIS - YOU ARE ALREADY ALIEN

### 3. SUBJECTIVITIES - DO YOU WANT TO BE MORE ALIEN?

#### Script of the Agency:

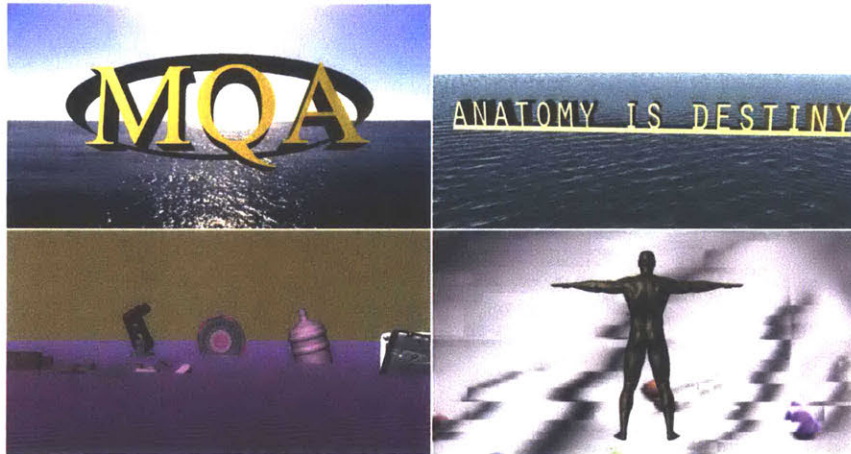
"I am here today to sell you a vision. A vision of a toxic world. Ours is an alien landscape, one that is mutating our bodies. Thanks to petrochemical, agricultural, and pharmaceutical industries, we live in a toxic landscape, that is colonized by hormones. These endocrine disrupting molecules arise from birth control pills, pesticides, plasticizers, electronics, and personal care products. These are markers of the Anthropocene, where the natural can no longer be disentangled, from the synthetic. The objects we encircle ourselves with, the food we eat, and the air we breathe, all become part of the process of sexing. These xeno molecules are capable of transfecting change at the morphological level, queering our bodies and bodies of non human species. This is a collective mutagenesis. We are collectively becoming alien.

Gender ambiguity. Intersexuality. Hermaphroditism. Queer possibilities. You may be scared at first. You may feel some anxiety. Fear of feminization. Loss of masculinity. Queer phobia. Sex Panic. Chemical Castration. You will want to hang tightly, to your heteronormative values. Male and Female binaries. Species propagation. You will want to believe in a reproductive futurism, that will save us from the encroaching apocalypse.

We offer you a vision, that will reframe toxicity, without reasserting a politics of purity. The Molecular Queering Agency will guard you against the old notion of a stable body. That sex determination is fixed and recalcitrant, is only a fiction that has been normalized by dominant patriarchal institutions. They will tell you: Anatomy is destiny. Say it with me! Anatomy is destiny.

Say it with me! But there is no need for sex panic. The production of the body is a constant process, an entanglement with the environment, a responsive potential changing over evolutionary time. The Molecular Queering Agency, acknowledges our bodies, as permeable, mutable, changeable, and disobedient.

Mutation, is how we build resilience for the future.  
We will use the becoming as an agent for resistance.”



**Video stills from the Molecular Queering Agency animation.** Animation is played along with the audio script.

In addition to the audio-visual projection, I performed a urine worshipping ritual alongside artist Viirj Kan in the MIT Media Lab building. We both did a live urination in front of a panel of professors and visiting guest critics, pouring the urine into a metallic fountain sculpture representing an object of disobedience. The urine itself is an unruly liquid with known traces of plastics and phthalates, biological proof of our multiple composition and queering bodies. The act of worshipping the urine symbolically ties endocrine disruption and sex panic with toxicological embrace, prompting us to let go of the fixed notions of sex and gender.



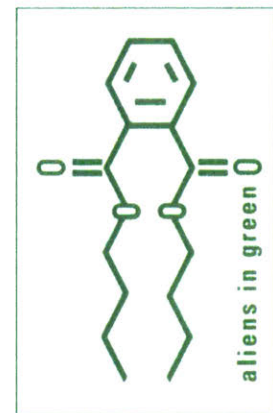
**Image from Molecular Queering Agency performance** audio-visual animation playing in the background. Performed with urine fountain sculptural element with live urination as the final project for Disobedient Objects course in Art, Culture, Technology (ACT) department at MIT.

## The Aliens in Green: *Xenopolitics #1* (2017)

In November 2016, I joined a collective called the Aliens in Green<sup>69</sup> who were dealing with the geopolitics of xeno-hormones and the semiotics of alien existence. Using tactical theater elements in public workshops (such as role playing, game scenarios, and performance), Aliens in Green attempt to reveal the “xeno-forces” that have altered our planet irrevocably (the formation of a “laboratory planet”), and in response speculate on a collective resistance called “xeno-solidarity.”

### Aliens in Green Official Description

The Aliens in Green (Bureau d'études, Ewen Chardronnet, Mary Maggic, Julien Paris, Spela Petric) is an investigative laboratory and tactical theater group combating the alien agents of anthropogenic xeno-power. Using media communication, open-science philosophy, and speculative fiction, the collective generates critical discourse and interventions in the public sphere. One may understand the Aliens in Green as both a symmetrical and antagonist entity to the “Men in Black.” They act as discursive agents dealing with human relations and life forms of a third type. But unlike the “Men in Black” who operate secretly and erase people’s memories, the Aliens in Green operate openly and tactically, allowing earthlings to identify the numerous collusions between capitalist and xeno-political forces.

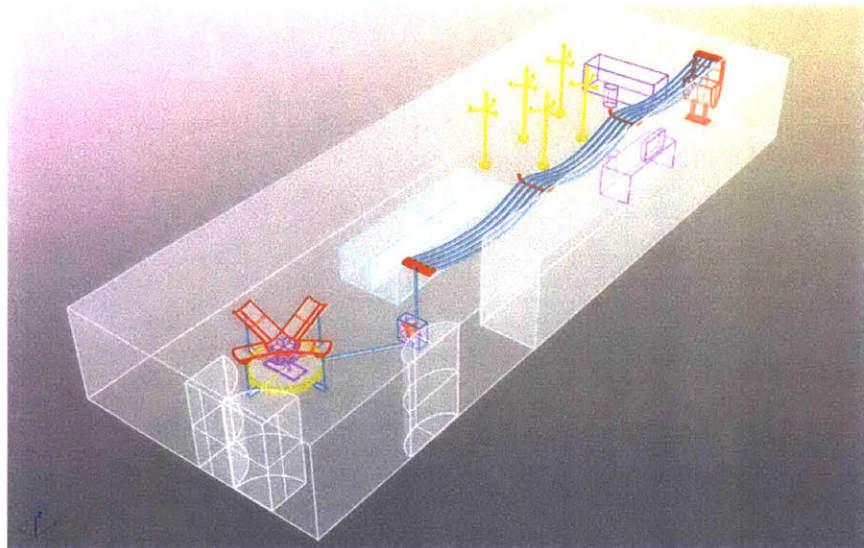


We made a debut at the Transmediale Festival (Berlin) in February 2017 in a group show called *Alien Matter*<sup>70</sup> where we exhibited *Xenopolitics 1: Petro-bodies and Geopolitics of Hormones*. This piece was a large scale installation meant to be activated by a public workshop performance. The elements included a web-based endocrine disruption map, poster graphics displaying the Aliens in Green manifesto and EDC geopolitics, water bottles labeled with “xeno-actors” and “xeno-molecules,” hormone milkers for urine extraction, and finally a urine sculpture fountain and fluid hydraulic system both designed and built by

<sup>69</sup> “Aliens in Green – Xenopolitics of the Anthropocene.” <http://aliensingreen.eu/>.

<sup>70</sup> “Alien Matter – An Introduction | Festival 2017.” <https://2017.transmediale.de/content/alien-matter-an-introduction>.

myself with the assistance of friend Alessandro Volpato. During the workshop, we dress in the Aliens in Green uniform and take participants through a scenario-building exercise that connects xeno-actors (corporations and politicians) with xeno-molecules (most commonly found endocrine disrupting compounds) with their queering effects. We then instruct participants to finish drinking water bottles labeled with these actors, molecules, and subjectivities. This symbolically creates urine which the participants to have to provide a sample of for the urine hormone extraction. Once the hormones are ready, we dissolve them back into vodka and offer hormone cocktails, asking members of the audience if they wish to be more alien than they already are.



**Installation schematic designed by Mary Maggic in Rhino 3D**

Exhibition Description (published in Transmediale program):

It is well known that exposure to synthetic chemicals (plasticizers, pesticides, birth control pills, etc.) interferes with the hormonal systems of humans and non-human species. Despite all the warnings about the toxic impacts of these endocrine disruptors, the lobbying of the petro-chemical, agricultural, and pharmaceutical industries continue to influence regulatory institutions in favor of their capitalist interests. These actors can be viewed as xeno-powers that both regulate and pollute our bodies and the environment. At the same time, terms like abnormal or disruptor are at the center of most environmental and critical discourse, focusing the main arguments on sex-panic, gender ambiguity, and threats to reproductive futurism. These arguments reinforce a politics of purity that reflects our prescribed eco-hetero-normative value system, a dominant regime of who and what are constructed as normal and natural. So we want to ask: do queers and our alien kin have no future in our increasingly toxic landscape? The Aliens in Green use abduction, interventionist tactics, and urine-hormone extraction to generate "a crisis of the body" that leads to new subjectivities that are non-prescriptive, offering a kind of alien resilience called xeno-solidarity.



**Image of Xenopolitics #1 installation at the Haus der Kulturen der Welt; Berlin, Germany (Transmediale festival)**

Workshop Description (published in Transmediale program):

In a two-part workshop, Aliens in Green (AiG) guide participants through the xeno-political process of queering. The first part begins in the installation Xenopolitics 1, introducing the toxic impact of endocrine disruption and the dominant constructs of who and what are defined as natural. A urine-hormone extraction ritual follows this presentation. In the second part, participants look at the urine-hormone extraction results, while AiG facilitate a discussion about what it means to be alien in light of the xeno-forces at play.



**Scenario building exercise (top-left). Water bottles labeled with xeno-actors and xeno-molecules (top-right). Hormone milkers by Spela Petric (bottom-left). Hormone cocktails (bottom-right).**

# Conclusion

When hormones were first identified, purified, and categorized in the early twentieth century, preexisting notions of gender had already inscribed themselves into the scientific research and medical practice, and consequently into the standard of how bodies should appear anatomically and behave physiologically. Synthetic molecules with known hormonal effects were even mass produced and prescribed to bodies to maintain heteronormality, and at the same time used to increase the plasticity of various industrial products. Both the hormonal management of bodies and present ecological toxicity are deeply entrenched and intertwined in powerful capitalistic forces, each grounded in a rigid heteronormative discourse that uses nature as its validator. We impede our own ability to rationalize and accept queerness as it exists currently and in our inescapable future - there will be no stop to the mutation of bodies and the generation of difference. From detection to extraction to synthesis, the recipes of *Open Source Estrogen* function as social resistance, as consciousness-raising, as DIY hormone therapy, as gender-hacking. These tools and tactics give citizens an intimate way to confront our all-pervasive, anthropogenic toxicity by reclaiming and refiguring definitions of "normal" and "natural," deconstructing at multiple layers: scientific protocols, sex/gender identities, public discourse, and of course, hormonal molecules.

*Open Source Estrogen* will forever be an open investigative project, constantly churning out new iterations, tactics, and discourses with various individuals and collectives. It rejects typified paradigms of sex and gender construction, biotechnological solutionism and techno-utopianism, and institutionalized laboratory science. And unlike models of the gallery that attribute artistic credits to the sole, famed artist, *Open Source Estrogen* has cross-contaminated with dozens of individuals with a wide range of expertise and amateurisms, who deserve as much acknowledgement as the artists who initiated it. And like the hormonal molecules it investigates and emancipates, the project is akin to a responsive body which never stops queering, a gender with no final destination.

# Acknowledgements

I want to give a huge special thanks to the following amazing people: Byron Rich, Paula Pin, Gaia Leandra, Spela Petric, and Pippo Bakschi, and to my thesis readers Hiromi Ozaki, David S. Kong, and Heather Dewey-Hagborg. Furthermore, I want to thank the Hackteria community (because of you - I play, I hack, I know, I know myself) and the countless individuals who participated in a workshop with me. It was an extreme pleasure hacking with all of you!

## ***Estrofem! Lab***

Kate Adamala  
Pippo Bakschi  
Dan Chen  
Vanessa J. Cheung  
Marc Dusjagr  
Carlos Gamez  
Urs Gaudenz  
Ryan Hammond  
Noah Jakimo  
Sachiko Kana  
Denisa Kera  
David S. Kong  
Gaia Leandra  
Solon Morse  
Van Tran Nguyen  
Amanda Padilla  
Spela Petric  
Paula Pin  
Yair Reshaf  
Byron Rich  
Andrew Smart  
Rudiger Trojok  
Paul Vanouse  
Josiah Zayner

## ***Housewives Making Drugs***

Benjamin Berman  
Jesse "The Jayder" Franklin  
Phyl Etienne Johnson  
Dan Novy  
Audrey Mercado Ortiz  
Leah Ann Mitchell  
Hiromi Ozaki  
Jade Phoenix  
Vince Rabaja  
Jade Renegade  
Byron Rich  
Mango Chijo Tree  
Christine Wang  
Eliza Hawk Weisman

## ***Micro Performativity of Sex***

### ***Hormones***

Pippo Bakschi  
Davide Bevilacqua  
Sam Bunn  
Yen Tzu Chang  
Maria Czernohorsky  
Laura Jade  
Patrick Schabus  
Sebastian Six

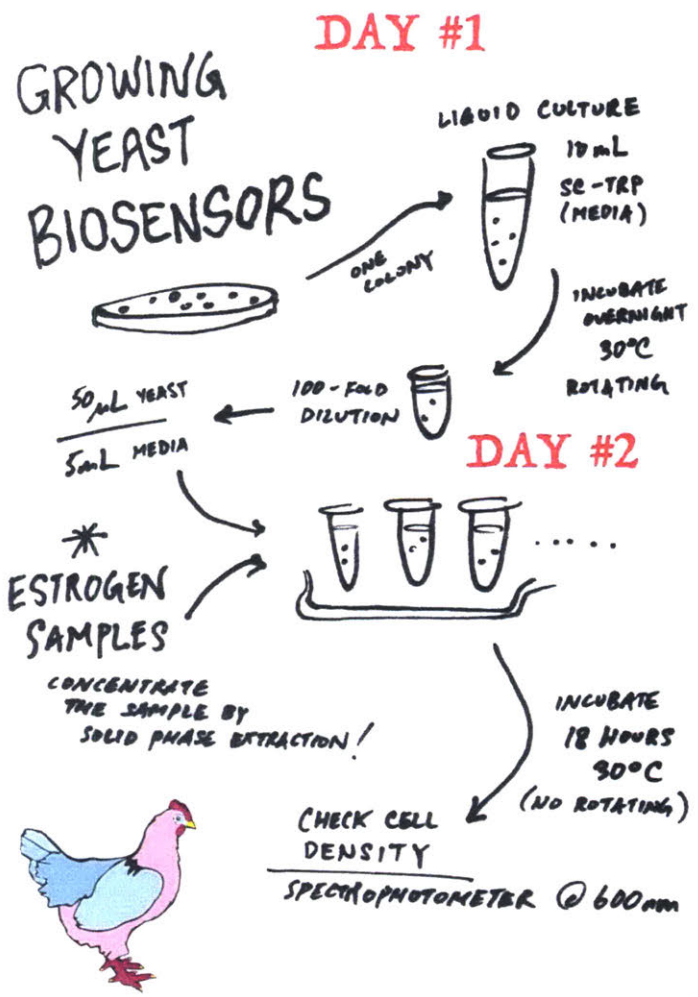
## ***Molecular Queering Agency***

Nikola Bojic  
Viirj Kan  
Miguel Perez  
Miriam Simun  
Gediminas Urbonas

## ***Aliens in Green: Xenopolitics***

### ***#1***

Inke Arns  
Pippo Bakschi  
Julien Bellanger  
Bureau d'études (Leo and  
Xavier)  
Ewen Chardonnet  
Nicolas Maigret  
Maria Roszkowska  
Julien Paris  
Spela Petric  
Alessandro Volpato





# Appendix 2: Urine-Hormone Extraction Workshop Protocol

## DIY COLUMN CHROMATOGRAPHY URINE-HORMONE-EXTRACTION-ACTION

THE FOLLOWING DOCUMENT IS FROM MARY MAGGIC TO EVENT ORGANIZERS. THANK YOU FOR YOUR INVITATION.

**RECIPE IS OPEN SOURCE - IT'S OKAY TO SHARE!**

LAST EDIT: 12 OF MARCH 2017

ONLINE REFERENCES:

<http://maggic.ooo/Open-Source-Estrogen-2015>

<http://maggic.ooo/Estrofem-Lab-2016>






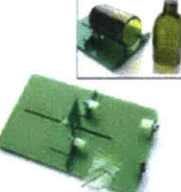

### A VAGUE DESCRIPTION (MORE WILL BE REVEALED DURING THE WORKSHOP):






*In response to the various ways that institutions both pollute and regulate our bodies through hormones, the Estrofem! Lab develops various methods of "freak science" for hacking estrogen and demonstrating its molecular colonization. From yeast biosensors for detection to DIY column chromatography for urine-hormone extraction, these recipes serve as kinds of 'biotechnical civil disobedience,' combining body-gender politics and queer discourse with civic science. The workshop will begin with a short presentation followed by hormone-extraction action. Bring your own urine!*



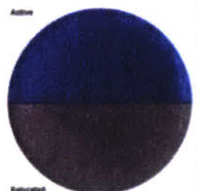


### QUESTIONS AND DISCURSIVE EXERCISES:






- How do bodies queer at the molecular level?
- How does that queering change based on body-type, intention, exposure, and desire?
- How can we "hack" this process, by way of freak-kitchen-science?
- What is a gender anyway, if there are increased bio-queer options?
- What is normality anyway, if our bodies are so open to mutation?





### MATERIALS:

				
Paper towels	Scissors	Plastic Cups for urine	Glass Bottle Cutter	Tweezers with needle nose

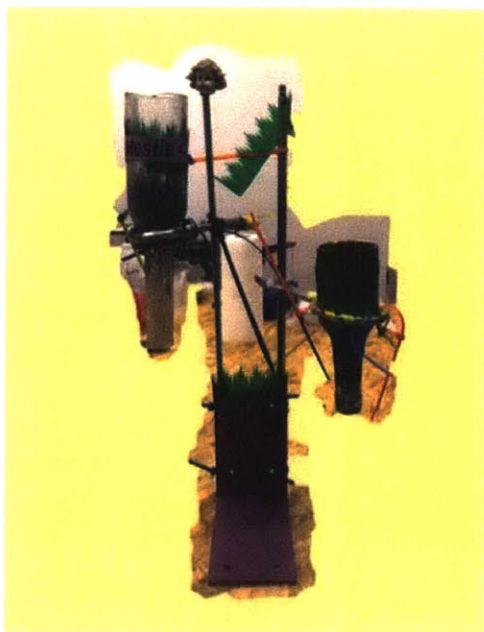
				
<i>U-post fence bracket</i>	<i>Angle Bracket</i>	<i>2 Metal Threaded Rods per bracket length/diameter: (20"/3/8") (500mm/9.5mm)</i>	<i>Zip-ties (large, colorful preferred)</i>	<i>Pipe Clamp with black rubber and threaded nail (various diameters)</i>

				
<i>Any glass bottle, recycled</i>	<i>Cigarette filters, variety of brands of compare</i>	<i>Blue to Pink Silica Gel (bulk on Amazon)</i>	<i>Parafilm</i>	<i>Methanol</i>

				
<i>Falcon Tubes (50mL)</i>	<i>Falcon Tube Rack (able to boil)</i>	<i>Hotplate</i>	<i>Aquarium air pump with 1/4" tubing</i>	<i>Pot for boiling</i>

-  = Items that I travel with and will provide
-  = Items that I travel with and will provide but in limited supply, please support if possible
-  = Items that I travel with and will provide, but please provide your own if you want to keep what you make
-  = Please provide these items





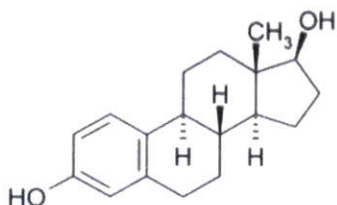
A angle bracket construction



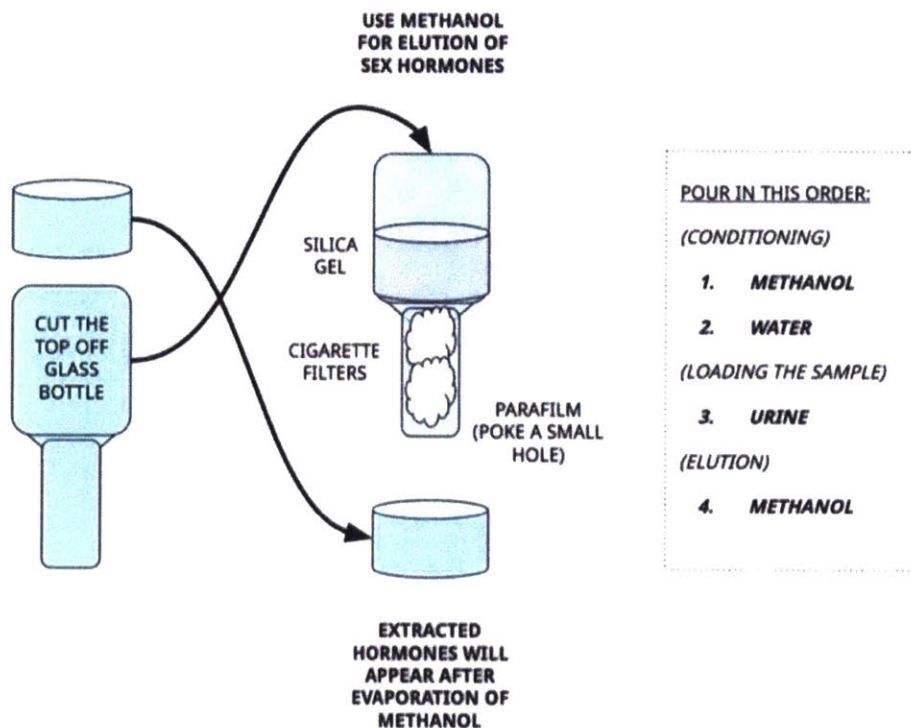
A U-post fence bracket construction

#### DIY Column Construction:

1. Two metal rods are fixed to bracket by zip ties.
2. One pipe clamp per metal rod is then fixed by zip ties.
3. Make an incision around a glass bottle using the glass bottle cutter.
4. Pour hot water around the incision, then cold water. This should cause the two pieces to separate. The cut glass bottle will be the column.
5. Wrap the neck opening with parafilm.
6. Poke a small hole with tweezers.
7. Pack column with a layer of cigarette filters (preferably to take off the wrapper). This will be the nonpolar environment.
8. Pack column with a layer of silica gel (amount depends on volume of bottle). This will be the polar environment.



Look at the estrogen molecule. Do you think it will bind to the cigarette filters or the silica gel?

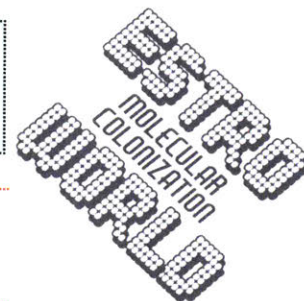


#### Urine Extraction:

1. Collect a urine sample in a plastic cup.
2. Place a new plastic cup underneath the column (waste collection).
3. Pour methanol (25-50mL) down the column. This is the "conditioning" step.
4. Now pour water down the column, washing any excess methanol.
5. Dispose the waste down the drain if it gets too full at this point.
6. Pour your urine sample down the column. This is called "loading the sample." Repeat at least 5 times to ensure binding of hormones to the cigarette filters.
7. Pour the waste down the drain.
8. Now "elute" the hormones (get them off the cigarette filters) by pouring methanol (<25mL) down the column. (Methanol is a solvent described in many scientific papers as having effective binding properties for steroidal molecules). Repeat at least 5 times to ensure efficient elution of hormones. **Make sure the final elution ends up in a 50mL falcon tube.**
9. Place the falcon tube of methanol-hormones in a pot of boiling water. Use air pump to facilitate the evaporation of methanol. This process varies depending on amount of methanol.
10. Once you see a dry, brown, sticky substance, you can take the tube off the hot water. The final product is a collection of hormones, or steroidal molecules in general. To isolate only estrogen would require an additional step of purification, which needs to be further investigated.
11. Smell and share with your friends!

# Appendix 3: Estrofem! Workshop Survey

Welcome to the OFFICIAL ESTROFEM WORKSHOP SURVEY. It was a pleasure hacking with you. Please take the time to answer the following questions with the best of your honesty.



NAME (optional)?	DATE?
WHERE ARE YOU FROM?	WHAT DO YOU DO?
DRAW A PICTURE!	HOW DO YOU IDENTIFY?*

Which workshop activity did you participate in? (Please check all that apply)

- YES-HER YEAST BIOSENSORS: DOES IT SAY YES TO HER?
- DIY COLUMN CHROMATOGRAPHY URINE EXTRACTION ACTION
- RIVER GYNECOLOGY XENO-WATERS S-P-EXTRACTION
- ALIENS IN GREEN XENO-POLITICS

For which event?

0. How many hours did you sleep last night?

1. Why did you join this workshop?

2. Do you have a prior experience with BIOHACKING/DIY/DIWO SCIENCE? If yes, please explain.

3. What did you find MOST INTERESTING about the workshop?

4. What did you find MOST BORING about the workshop?



6. What is something you learned that you didn't know before?

7. Would you like to ask something to me? Please write.

8. How was the balance between conceptual and technical knowledge?

9. How do you perceive HORMONES now and why?

10. What were your expectations of the workshop prior and after?

11. How feasible is to replicate the recipes you learned today? Are you going to try it?

12. How do you think the workshop can IMPROVE?

\*list of gender identity options given by Facebook as of 2016:

Agender, Androgyne, Androgynous, Bigender, Cis, Cisgender, Cis Female, Cis Male, Cis Man, Cis Woman, Cisgender Female, Cisgender Male, Cisgender Man, Cisgender Woman, Female to Male, FTM, Gender Fluid, Gender Nonconforming, Gender, Questioning, Gender Variant, Genderqueer, Intersex, Male to Female, MTF, Neither, Neutrois, Non-binary, Other, Pangender, Trans, Trans\*, Trans Female, Trans\* Female, Trans Male, Trans\* Male, Trans Man, Trans\* Man, Trans Person, Trans\* Person, Trans Woman, Trans\* Woman, Transfeminine, Transgender, Transgender Female, Transgender Male, Transgender Man, Transgender Person, Transgender Woman, Transmasculine, Transsexual, Transsexual Female, Transsexual Male, Transsexual Man, Transsexual Person, Transsexual Woman, Two-Spirit

Is time to make the forbidden  
decision...

What you wanna do?  
What you wanna be?

PASSIVE OR ACTIVE? Will u rise up for  
your BIOAUTONOMY?

Let's doing a **SOCIAL MUTAGENESIS...**

/

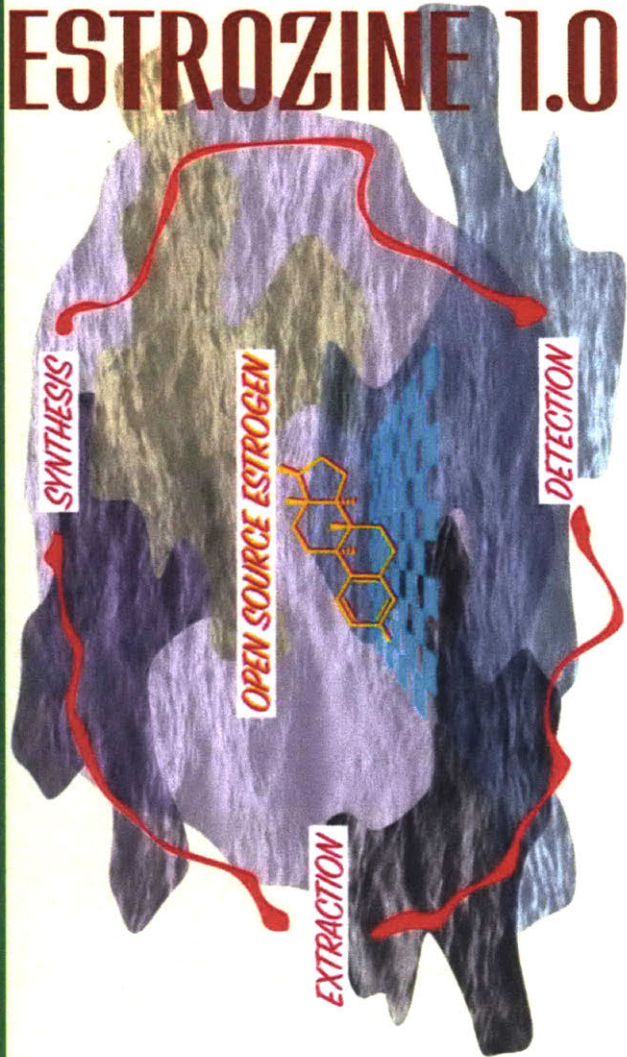
Es el momento de tomar  
una decisión prohibida...

¿Qué quieres hacer?  
¿Qué quieres ser?

¿ACTIVX O PASIVX? ¿Lucharás por tu  
BIOAUTONOMÍA?

Hagamos una **MUTAGENESIS SOCIAL...**

# ESTROZINE 1.0



Mary Tsang  
Byron Rich  
Gala Leandra  
Paula Pin  
Carlos Gamez  
Amanda Padilla

# LA BIO-LENTA\* Y LA PARADOJA DE LA DISRUPCIÓN

*Toxicidad ambiental y  
Biopolítica contra la  
soberanía del Cuerpo y  
el Género (vs.)*

## SLOW BIO-LENCE and THE PARADOX OF DISRUPTION

*Enviromental Toxicity and  
the Biopolitics in Body &  
Gender  
Sovereignty*

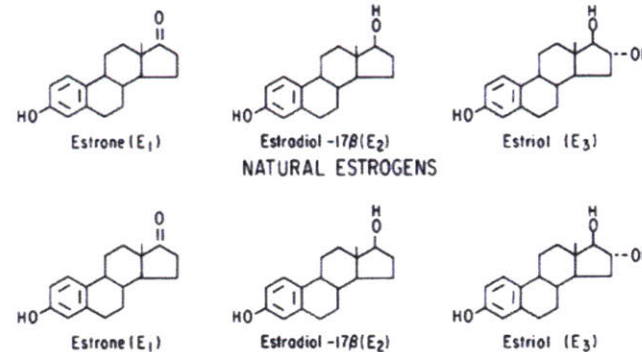
\*[SLOW VIOLENCE > BIO-LENCE > BIO-LENCIA + SLOW = BIO-LENTA]

This system of defining binaries is perpetuated by a institutional and corporate actors, yet sets up as fascinating and oft-overlooked interstitial interweaving of ecological and identity politics whereby the very institutions that aim to entrench a binary notions pollutes ecosystems with compounds that offer much in the way of body sovereignty. Open Source Estrogen acts as a tactical subversion of such a system, where estrogenic compounds and endocrine disruptors that pollute ecosystems are detected and extracted by the populations marginalized by a binary social construct for speculative deployment as birth control and hormone therapy options existing outside of the institutional structure.

By preparing individuals to detect and extract estrogen an estrogenic compounds, we are building a familiarity with scientific processes, deconstructing one of the "black boxes" of technological development, allowing amateur exploration and deployment of institutionalized compounds. The project acts to critically examine and critique a system of institutionalized marginalization that, at once, aims to control human bodies while also polluting ecosystems with the very things that would offer individuals greater access to control over their notion of "self".

**EMANCIPATE THE ESTROGEN MOLECULE!!!!**

### NATURAL ESTROGENS





## >BODY SOVEREIGNTY CONSTRUCTION OF THE INDIVIDUAL

As Hardt & Negri contend, common knowledge of today is in the future of all new knowledge production; innovation and technological advancement become the common knowledge of tomorrow. The evolutionary development of technology - the continual building off of a predecessor - is similar in that the commonplace of tomorrow is predicated upon the innovation of today. However, the insitutionalization of knowledge, removing it from the realm of the common or commoner, and the creation of "blackboxes" - fully closed systems seemingly inoperable or repairable by the amateur - undermine the innovation-to-common-knowledge cycle by establishing a system whereby institutions and corporations dictate public perceptions of possibility. In doing so, defeating much amateur exploration of what are considered professional or insitutional knowledges.

If body sovereignty is framed as a latent process, in that an individual has dominion over outside perceptions of what constitutes "self", then it the monotization as we have seen occur under the neoliberal idealogical framework, is an affront to the identity construct of the individual. Contemporary persepectives have been defined by what Latour calls "asymmetrical epistemological process, Purification whereby binaries are held and enforced as rule. In such a system, domain over ones "self" is pushed to the margins unless falling within what is socially held as "normal".

Biotechnology, as Foucault suggests, is a form of surveillance technology. Not only does biotech monitor, but it also regulates institutionally defined notions of "normaly" perpetuated a paradigm of binaries.

### LA BIO-LENTA Y LA PARADOJA DE LA DISRUPCIÓN

*Toxicidad ambiental y  
Biopolítica contra la  
soberanía del Cuerpo y  
el Género*

La **BIO-LENTA** es el ejercicio de la violencia Biopolítica contra la capacidad individual de decisión.

*La Paradoja de la Disrupción* nos recuerda cómo el poder hegemónico silencia la forma en la que intoxica nuestros cuerpos al mismo tiempo que patologiza las identidades disidentes de género. Partiendo de esto... aclaremos algunos conceptos.

#### *¿Qué es la Biopolítica?*

Hay diferentes manera de definir la biopolítica. De acuerdo con Foucault, la biopolítica es la manera en la que el gobierno regula a la población a través del biopoder, es decir, la aplicación e impacto político del poder en todos los aspectos de la vida humana.

### SLOW BIO-LENCE and THE PARADOX OF DISRUPTION

*Enviromental Toxicity  
and the Biopolitics in  
Body & Gender  
Sovereignty*

**SLOW BIO-LENCE** is the exercise of Biopolitical violence against individual decision capacity.

*The Paradox of Disruption* reminds how the hegemonic power mutes the way in which intoxicates our bodies and at the same time pathologizes dissident gender identities. Starting from this... Let's clear some concepts.

#### *What is Biopolitics?*

There are different ways to define biopolitics. However, according to Foucault, biopolitics is the style of government that regulates populations through biopower, the application and impact of political power on all aspects of human life.

"El control de la sociedad sobre los individuos no sólo se efectúa mediante la conciencia o por la ideología, sino también en el cuerpo y con el cuerpo. Para la sociedad capitalista es lo bio-político lo que importa ante todo, lo biológico, lo somático, lo corporal." (Foucault)

Para comprender esta forma de dominación, es importante entender dos conceptos principales: Zoé y Bios.

**Zoé** significa en griego clásico simplemente 'vida'.

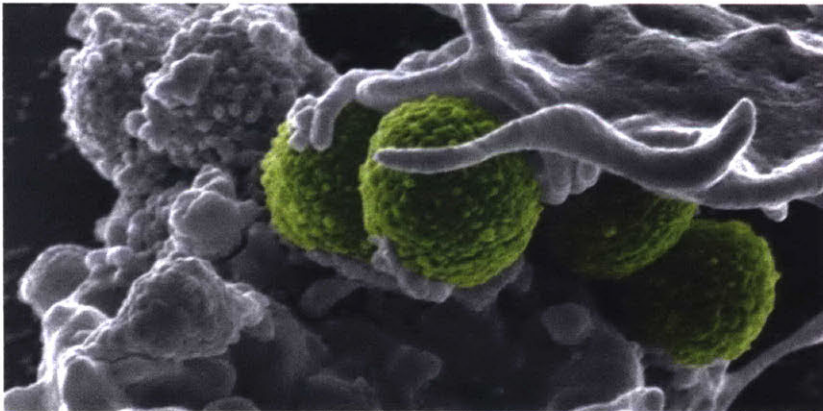
**Bios** hace referencia a la vida política.

"The control of society over individual not is only practicing through consciousness or ideology, if not is also making in the body and through the body. For capitalist society, biopolitical is the most important thing, biologic, somatic, corporal... is the main issue." (Foucault)

To understand this form of domination, it is important to understand to main concepts: Zoé and Bios.

**Zoé** means in old Greek bare life.

**Bios** is the political life.



**0x02** Why is there so little explicit, organized effort to repurpose technologies for progressive gender political ends? XF seeks to strategically deploy existing technologies to re-engineer the world. Serious risks are built into these tools; they are prone to imbalance, abuse, and exploitation of the weak. Rather than pretending to risk nothing, XF advocates the necessary assembly of techno-political interfaces responsive to these risks. Technology isn't inherently progressive. Its uses are fused with culture in a positive feedback loop that makes linear sequencing, prediction, and absolute caution impossible. Technoscientific innovation must be linked to a collective theoretical and political thinking in which women, queers, and the gender non-conforming play an unparalleled role.

**0x03** The real emancipatory potential of technology remains unrealized. Fed by the market, its rapid growth is offset by bloat, and elegant innovation is surrendered to the buyer, whose stagnant world it decorates. Beyond the noisy clutter of commodified cruff, the ultimate task lies in engineering technologies to combat unequal access to reproductive and pharmacological tools, environmental cataclysm, economic instability, as well as dangerous forms of unpaid/underpaid labour. Gender inequality still characterizes the fields in which our technologies are conceived, built, and legislated for, while female workers in electronics (to name just one industry) perform some of the worst paid, monotonous and debilitating labour. Such injustice demands structural, machinic and ideological correction.

**0x04** Xenofeminism is a rationalism. To claim that reason or rationality is 'by nature' a patriarchal enterprise is to concede defeat. It is true that the canonical 'history of thought' is dominated by men, and it is male hands we see throttling existing institutions of science and technology. But this is precisely why feminism must be a rationalism—because of this miserable imbalance, and not despite it. There is no 'feminine' rationality, nor is there a 'masculine' one. Science is not an expression but a suspension of gender. If today it is dominated by masculine egos, then it is at odds with itself—and this contradiction can be leveraged. Reason, like information, wants to be free, and patriarchy cannot give it freedom. Rationalism must itself be a feminism. XF marks the point where these claims intersect in a two-way dependency. It names reason as an engine of feminist emancipation, and declares the right of everyone to speak as no one in particular.

## Xenofeminism: A Politics for Alienation

Laboria Cuboniks

### ZERO

0x00 Ours is a world in vertigo. It is a world that swarms with technological mediation, interlacing our daily lives with abstraction, virtuality, and complexity. XF constructs a feminism adapted to these realities: a feminism of unprecedented cunning, scale, and vision; a future in which the realization of gender justice and feminist emancipation contribute to a universalist politics assembled from the needs of every human, cutting across race, ability, economic standing, and geographical position. No more futureless repetition on the treadmill of capital, no more submission to the drudgery of labour, productive and reproductive alike, no more reification of the given masked as critique. Our future requires depetrification. XF is not a bid for revolution, but a wager on the long game of history, demanding imagination, dexterity and persistence.

0x01 XF seizes alienation as an impetus to generate new worlds. We are all alienated – but have we ever been otherwise? It is through, and not despite, our alienated condition that we can free ourselves from the muck of immediacy. Freedom is not a given—and it's certainly not given by anything 'natural'. The construction of freedom involves not less but more alienation: alienation is the labour of freedom's construction. Nothing should be accepted as fixed, permanent, or 'given'—neither material conditions nor social forms. XF mutates, navigates and probes every horizon. Anyone who's been deemed 'unnatural' in the face of reigning biological norms, anyone who's experienced injustices wrought in the name of natural order, will realize that the glorification of 'nature' has nothing to offer us—the queer and trans among us, the differently-abled, as well as those who have suffered discrimination due to pregnancy or duties connected to child-rearing. XF is vehemently anti-naturalist. Essentialist naturalism reeks of theology—the sooner it is exorcised, the better.

## SEXY FOUCAULT



reparish comics

Foucault sugiere que con la aparición del estado moderno, la zoé se incluyó en el bios con la intención de controlarlo.

Sin embargo, Giorgio Agamben (Roma, 1942) repiensa la biopolítica foucaultiana. Se pueden encontrar dos importantes diferencias:

1. El **biopoder** se apropia de la zoé de la ciudadanía para su manipulación política desde los comienzos de la hegemonía occidental, en la polis griega.

Foucault suggest that with the rise of the modern state, zoé is included into bios in order to control it.

But Giorgio Agamben (Rome, 1942) rethinks Foucault's biopolitics. One can find two important **differences** between Agamben and Foucault:

1. **Biopower** takes Zoé of the citizens into its political calculations since the beginnings of sovereignty in the West, in the Greek polis.



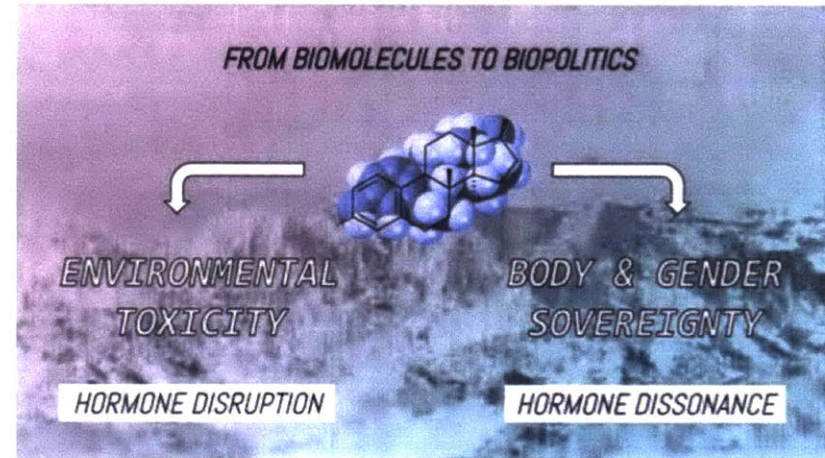
## Xenofeminismo: Una política por la alienación: Laboria Cuboniks

### ZERO

0x00 El nuestro es un mundo en vértigo. Es un mundo invadido por mediaciones tecnológicas, que entrelazan nuestras vidas diarias de manera abstracta, virtual y compleja. XF construye un feminismo adaptado a estas realidades: un feminismo de ingenio, escala y visión sin precedentes; un futuro en el que la realización de la justicia de género y de la emancipación feminista contribuya a una política universalista ensamblada a partir de las necesidades de cada persona, independientemente de su raza, habilidad, posición económica o posición geográfica. No más repetición sin futuro en la espiral del capitalismo, no más sumisión a la monotonía del trabajo, sea productivo o reproductivo, no más cosificación de lo natural como criterio de lo normal. Nuestro futuro requiere una despetrificación. XF no es una oferta de revolución, sino una apuesta a largo plazo por el juego de la historia, que exige imaginación, destreza y persistencia..

0x01 XF aprovecha la alienación como estímulo para generar nuevos mundos. Todxs estamos alineadxs - pero ¿ha habido algún momento en que no lo hayamos estado? Es a través de, y no a pesar de, nuestra condición alienada que podemos liberarnos de la basura de la inmediatez. La libertad es algo dado y ciertamente no se nos da por "naturaleza". La construcción de la libertad no involucra menos alienación, sino más; la alienación es el trabajo de la construcción de la libertad. No deberíamos admitir nada como fijo, permanente o "dado" - ni las condiciones materiales ni las formas sociales. XF muta, navega y sondea cada horizonte. Cualquiera que se haya considerado "no-natural" bajo las normas biológicas reinantes, cualquiera que haya experimentado injusticias en nombre del orden natural, comprenderá que la glorificación de "lo natural" no tiene nada que ofrecernos -a lxs queer y trans entre nosotrxs, a las personas con diversidad funcional, como tampoco a quienes han sufrido discriminación debido al embarazo o a las tareas ligadas a la crianza. XF es vehementemente anti-naturalista. El naturalismo esencialista apesta a teología -cuanto más rápido lo exorcicemos, mejor.

## > MOLECULAR COLONIZATION AND ENVIRONMENTAL TOXICITY / > COLONIZACIÓN MOLECULAR Y TOXICIDAD AMBIENTAL

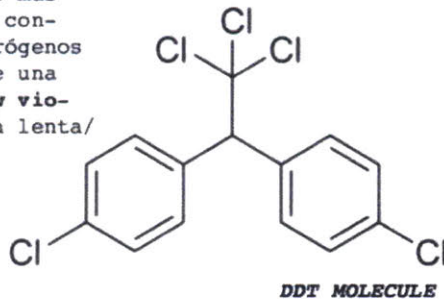


La contaminación con **xenoestrogenos** está interfiriendo con los **estrógenos naturales**, lo que provoca una serie de disfunciones y enfermedades en el sistema hormonal de los seres vivos. Los xenoestrógenos provienen de la síntesis de una serie de productos de las **industrias química y farmacéutica**, creados en la década de 1930, el DDT y el DES.

**Xenoestrogen pollution** is interfering with natural estrogens and provoking malfunctioning and diseases in the hormonal systems of the living beings. Xenoestrogens were synthesized by **chemical and pharmaceutical industry** in 1930's, such as DDT and DES.

Los xenoestrógenos químicamente sintetizados pueden permanecer en el medioambiente hasta 100 años. Además, se ha demostrado científicamente que se transmiten a través de recipientes de plástico (especialmente, de PVC) Esas son las causas principales de la contaminación por estrógenos. Los Xenoestrógenos son **DISRUPTORES HORMONALES**, es decir, generan cambios en la funcionalidad del sistema endocrino.

Gracias a las teorías de Agamben, se puede asimilar la contaminación por xenoestrógenos como una forma de control biopolítico, porque **afecta al equilibrio hormonal de los seres vivos**, incluidos los humanos. Y más concretamente, la contaminación de estrógenos puede considerarse una expresión de "slow violence" o violencia lenta/paulatina.



Chemically synthesized xenoestrogens can rest in the environment during 100 years. In addition, it was scientifically demonstrated that xenoestrogen can be transmitted through plastic containers. These are the main causes of estrogen pollution. **Xenoestrogen is an HORMONAL DISRUPTOR**, make changes in the functionality of endocrine system.

Using Agamben's approach, one can understand xenoestrogen pollution as a form of biopolitical control, because it **affects the hormonal balance of living beings**, including humans. Concretely, estrogen pollution can be considered as an expression of **slow violence**.



Necesitamos reapropiarnos de la soberanía de nuestros cuerpos, deberíamos resignificar y decolonizar los términos y procesos, y, finalmente, tenemos que hackear el control de la institución mediante la **DESOBEDIENCIA CIVIL BIOTÉCNICA**.

We need to reappropriate our **bodies sovereignty**, we should resignificate and decolonize the terms and processes and finally we have to **hack the institution control** through the **BIOTECHNICAL CIVIL DESOBEDIENCE**.



¿Cómo? Queremos **desmitificar** las objeciones sobre la experimentación hormonal. Si conocemos los niveles de toxicidad podremos proteger nuestra soberanía. **Abriremos el código** de nuestra experimentación para la intervención política. Este proyecto **biohacking** podría ser un fantástico camino para la **inyección cultural de la resistencia**.

How??? We want to **demystificate** the objections around hormonal experimentation. If we know levels of toxicity we could protect our sovereignty. We will **open the source** of our experimentation for political intervention. This **biohacking** project could be an amazing path of **cultural injection of resistance**.



EL ROTO

¿Qué es la violencia paulatina [a.k.a BIO-LENTA]?

Según expone Rob Nixon en el libro *Slow Violence and the Environmentalism of the Poor*, la **violencia lenta es un tipo de violencia que tiene lugar gradualmente y fuera de la vista (pública)**. No es un tipo de violencia espectacular e instantánea, sino un tipo de violencia que muchas veces no se considera como tal. En nuestro caso, la contaminación por xenoestrógenos se adapta perfectamente a la idea de violencia paulatina porque la opinión pública no actúa sobre ella por falta de información. **La omnipresencia de xenoestrógenos es un acto silencioso y progresivo de envenenamiento.**

**What is Slow Violence?**

According to Rob Nixon in *Slow Violence and the Environmentalism of the Poor*, slow violence is **a kind of violence that occurs gradually and out of sight**. It is not a spectacular and instantaneous violence but a kind of violence that is typically not viewed as violence. In our case, xenoestrogen pollution fits perfectly well with the idea of slow violence because public opinion don't act around it because don't have enough information. **The omnipresence of xenoestrogens is a silence and progressive act of poisoning.**

Según se pudo ver en los ataques terroristas del 11 de septiembre, el tratamiento de la violencia por parte de los medios se fundamenta en el espectáculo.

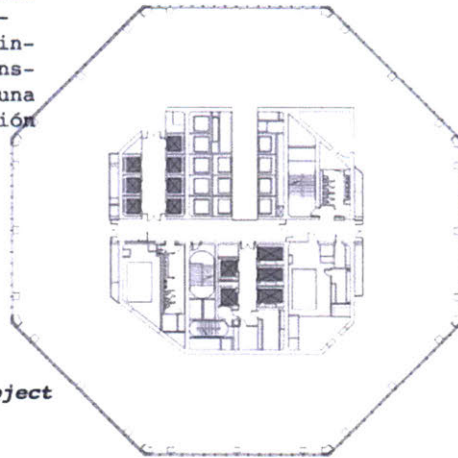
Los medios de comunicación no suelen prestar atención a las desgracias producidas por la violencia paulatina, como la contaminación por estrógenos.

Uno de los objetivos principales del proyecto **Estrógenos de Código Abierto** consiste en ofrecer al público la información relacionada con la contaminación de estrógenos en el agua de Madrid para implicar a la sociedad civil, exigir intervención política institucional y ofrecer una reflexión sobre la acción corporal subversiva.

As 9/11 terrorist attacks showed, media treatment of violence is focused on spectacle.

Slow violence calamities, as estrogen contamination, use to be unattended by media.

One of the main goals of **Open Source Estrogens Project** is bring to public the information related to estrogen contamination in Madrid water for involve civil society, ask for institutional political intervention and offer a reflexion over estrogenic subversive corporal actions.



WTC NY Project



La contaminación de xenoestrógenos no está controlada ni calibrada por ningún parámetro de sostenibilidad ecológica. Sin embargo, existen consecuencias sobre el funcionamiento de nuestros cuerpos por la exposición prolongada a estos niveles no analizados ni identificados. El silencio consentido en pro de los intereses económicos liberales nos afecta.

La ficcionalidad del sistema sexo/género acompañado de una concepción binarista y cissexista de la sociedad, desnormaliza la soberanía del cuerpo y el género patologizando las identidades trans, inter, queer...

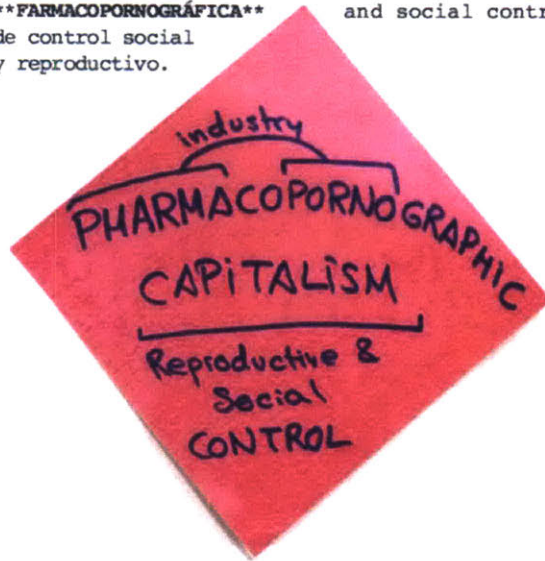
Xenostrogen pollution isn't controlled neither calibrated by none parametre of ecological sustainability. However, there is disrupting consequences in our bodies because of the longtime exposure to unanalyzed neither identified high levels of xeno's. There is a consenting silent in favour of economic liberalist benefits that is affecting us. The fiction of sexual/gender system in addition of a binarist and cissexist conception of society, unnormalization of the sovereignty of body and gender pathologizing trans, inter, queer (...) identities.



La cosa es, ¿por qué no podemos decidir cómo queremos exponer nuestros cuerpos? La contaminación por xenoestrógenos es ocultada por el poder porque la regulación y control de su toxicidad es controvertida.

Por otra parte, la normatividad enclaustra la posibilidad de hackear nuestros cuerpos para romper el sistema hegemónico y los privilegios del sistema cissexista.

Esta demente situación se asemejaría a algo como una **INDUSTRIA CAPITALISTA \*\*FARMACOPORNOGRÁFICA\*\*** de control social y reproductivo.



The matter is, Why we can not decide how we want to expose our bodies? Xenoestrogens pollution is covered by power because it's controversial regulate and control their toxicity.

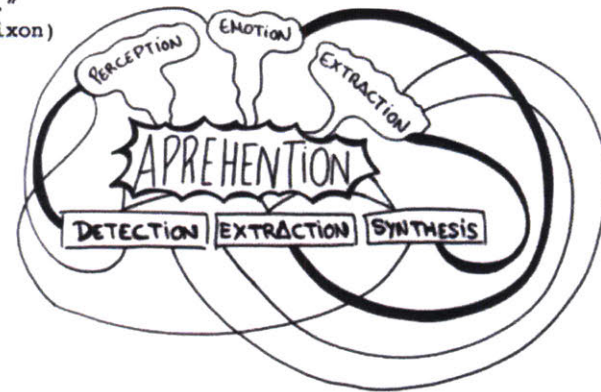
In other hand, normativity enclose the possibilities of hack our bodies to crack the hegemonic system and the privilege of gender cissexism.

This insane establishment seems such a **PHARMACOPORNOGRAPHIC CAPITALIST INDUSTRY** of reproductive and social control.

**Estrógenos de Código abierto Open Source Estrogens**

“Escritorxs, filmmakers y activistas digitales podrían jugar un rol mediador ayudando a contrarrestar la invisibilidad estratificada resultante de las amenazas insidiosas, procedentes de la temporalidad prolongada, a que las afectadas, son personas cuya calidad de vida - y con frecuencia cuya existencia - es de interés indiferente a los grandes medios de comunicación.”  
(Rob Nixon)

“Writers, filmmakers, and digital activists may play a mediating role in helping counter the layered invisibility that results from insidious threats, from temporal protractedness, and from the fact that the afflicted are people whose quality of life—and often whose very existence—is of indifferent interest to the corporate media”.  
(Rob Nixon)



Centradxs en esta propuesta, abordamos una reconsideración del proyecto con la idea de la **Aprehensión**.

Focused on this proposal, we engaged a reconsideration of the project with the idea of **Apprehension**.



Primero, la aprehensión perfila la **percepción, la emoción y la acción**, por otra parte, nuestro proyecto incluye la **detección, extracción y la síntesis** de estrógenos. Existe una relación directa entre estas dos tríadas de conceptos, pero existe también un diálogo multidireccional de los seis conceptos. Segundo, aprehendiendo algo potencialmente peligroso, como los estrógenos diseminados en el ambiente madrileño, y usándolo como un arma creativa y comunicativa, **creamos una subversión artística.**

Con la ayuda de **tecnologías contemporáneas de bajo coste**, invitamos a un replanteamiento en la percepción temporal de los procesos alteradores y violentos sobre Gaia (la Tierra es el mejor evidenciador de problemas contaminantes). Para ello, tomamos muestras de agua de la ciudad de Madrid, las analizamos en nuestro laboratorio biológico casero y las geolocalizamos. Experimentamos con la detección y extracción del estrógeno de las muestras y liberamos el conocimiento mostrando cómo **construir un Laboratorio DIY con materiales cotidianos.**

Firstly, apprehension draws **perception, emotion and action**, in other hand, our project involves **detection, extraction and synthesis** of estrogens. There exist a direct link between these two triads of concepts, but there is also a more open multidirectional dialogue of these six concepts. And secondly, by apprehending something potentially dangerous, such us estrogens disseminated in Madrid environment, and using them as a creative and communicative weapon, we create an artistic subversion.

With the help of **contemporary low cost technologies**, we invite public a changing perception of time of violent and changing processes through the idea of Gaia (the Earth is the real clock of pollution issues). On this way, we take some samples of water from the city, we analyze them in our homecraft biological lab and we geolocate the results. We have experimented with detection and extraction of samples estrogen and open the knowledge showing how **make a DIY LAB with rutinary materials.**

Al mismo tiempo, las **personas Transgénero son tratadas como enfermas**, sometidas a la **diagnosís y experimentación del poder**, y la **libre experimentación de la disrupción hormonal está encriptada.**

Tanto la toxicidad ambiental como las acciones corporales subversivas, están envueltas en la **disrupción hormonal.**

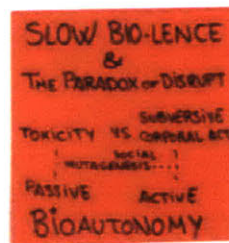
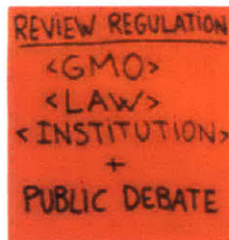
Las hormonas sexuales están dentro de nosotrxs y pululan por nuestro entorno afectando nuestros cuerpos.

At the same time, **Transgender people is treated like diseased**, brought under **diagnostics and experimentation of power**, and the **free experimentation of voluntary hormonal disruption is encrypted.**

Enviromental toxicity and subversive corporal actions, are the both involved in **hormonal disruption.**

Sex hormones are inside all of us and run around our enviroment affecting our bodies.





Post-it and Process

## >THE PARADOX OF DISRUPTION / >>LA PARADOJA DISRUPTIVA

### DISRUPTION

tr.v. dis·rupt·ed, dis·rupt·ing, dis·rupts

1. To throw into confusion or disorder.
2. To interrupt or impede the progress of something
3. To break apart or alter so as to prevent normal or expected functioning

### DISRUPCIÓN

Del ingl. disruption, y este del lat. disruptio, -ōnis, var. de diruptio, -ōnis 'rotura, fractura'.

1. Generar confusión o desorden.
2. Interrumpir o impedir el progreso de algo.
3. Romper o alterar el normal o esperado funcionamiento de algo

Mientras el actual y voraz **sistema hegemónico de consumo** nos envenena lentamente, a través de la toxicidad ambiental estrogénica provocada por las dinámicas de la alta productividad industrial y la explotación agrícola, los **cuerpos disidentes**, inclasificables en los parámetros binómicos, son patologizados.

Mientras la Institución médica, política, psiquiátrica y farmacéutica coloniza nuestros cuerpos, la industria agroalimentaria los altera desde la **BIO-LENTE**.

While the currently and edacious **hegemonic system of consumption** is poisoning us slowly, by estrogenic environmental toxicity pumped by high productivity industrial processes and agricultural exploitation, the **disident bodies**, undescripting by binomics parameters, are pathologized.

While the medical, political, psychiatric and pharmaceutical institution colonizes our bodies, the food industry is breaking apart their functions hide in the **slow violence**.

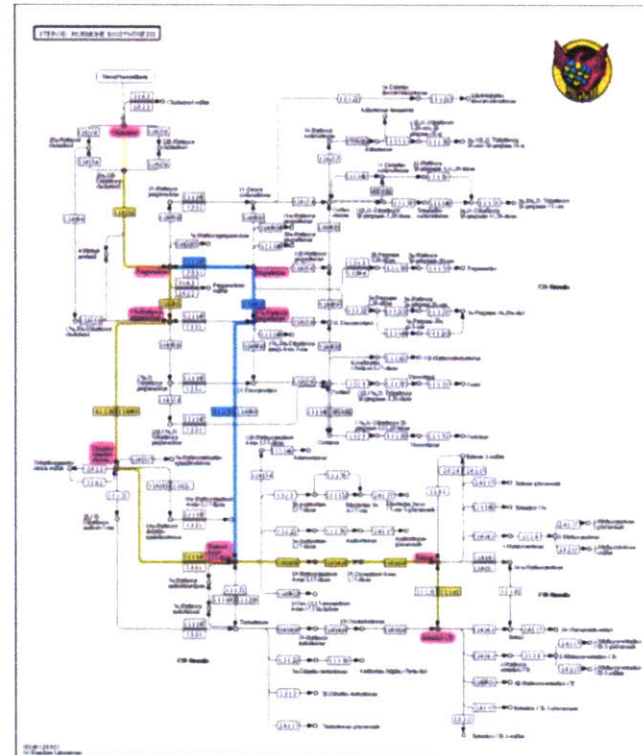
**WHO OR WHAT DOES  
ESTROGEN PRIORITIZE  
OR PATHOLOGIZE?**

**¿QUIÉN O QUÉ HACEN LOS  
ESTRÓGENOS PRIORIDAD O  
PATOLOGIZAR?**



THE KITCHEN IS A POLITICALLY CHARGED SPACE PRESCRIBED TO WOMEN AS THEIR PROPER DWELLING, THEREFORE MAKING IT THE PRECISE CONTEXT TO PERFORM AN ESTROGEN SYNTHESIS RECIPE.

WITH RECENT DEVELOPMENTS IN THE FIELD OF SYNTHETIC BIOLOGY, THE CUSTOMIZED KITCHEN LABORATORY MAY BE A UBIQUITOUS POSSIBILITY IN THE NEAR FUTURE.



# Appendix 5: Housewives Making Drugs Show Script

## **ACT I (PHOENIX & RENEGADE)**

SCENE: It's a sunny LA Day  
(opens with various shots of LA)  
Phoenix (PX) coming out of a liquor store with a 6 pack  
She stops in front of entrance  
Shot of her hands opening a beer with a lighter  
Change to Renegade (RG) sitting on her couch at home  
Shot of her hands packing a bowl and unpacking clippers  
Change to Phoenix walking up the street to renegades house,  
Shes drinking the beer as she walks up the street  
Change to Renegade setting up the clippers and picking up pipe for a hit  
Change to Phoenix walking up and opening the door to renegades house  
Change to Renegade seeing Phoenix and putting down pillow between her legs on the floor  
Patting it to indicate to Phoenix to sit down  
Shot of phoenix handing renegade beer and sitting down  
Shot of renegade handing Phoenix pipe  
Front shot of Phoenix taking a hit and Renegade taking a sip  
Renegade Puts beer down and starts up clippers  
Renegade starts cutting Phoenix hair  
They sit in a Quiet, familiar, intimate silence  
Sound of the buzzer and silence

PX: (Opening mail, insurance letter getting denied) Oh fuck!

RG: what?!

PX: Remember how I was waiting to hear back about my health insurance

RG: Yeah?

PX: well since that fucking cheeto head became president and cut Obamacare my hormones aren't covered anymore

RG: this fucking sucks

PX: I mean damn, remember last year how hard it was just to get my hormones to begin with!!

RG: ugh, That Judgemental ass doctor

PX: A whole Transphobic healthcare system

RG: all those bureaucratic hoops and Invasive body exams

PX: That shitty Therapist referral I needed to make sure i was

BOTH: A REAL TRANSGENDER

PX: Fuck its 2017 already, i shouldn't have to be fighting just for basic health care!

(Extended Long buzzzz from razor)

RG: I wish there was an easier way to get hormones!

PX: Seriously

They both stare out into the distance

(Bubble screen fade to kitchen show)

## **ACT II (HOUSEWIVES MAKING DRUGS)**

SCENE: (Theme music playing) Kitchen show setting, cold open to both PX and RG in front of Island

BOTH: Hello and welcome to our show!

PX: I'm maria

RG: And I'm maria

PX: And we are...

BOTH: "Housewives Making DRUGS!!!

(Shots to Audience cheering)

(Show LOGO flashes on screen)

PX: On today's show, maria and I are going to show you viewers at home how to get hormones without needing that pesky doctor's prescription.

RG: That's right Maria! We've concocted a recipe where we can reuse estrogen expelled from our bodies!

(Cut to audience close up reaction wowing)

PX!! so you are saying this recipe would allow us to circumvent the whole medical industrial complex???

RG: and increase access for trans women to gain radical body autonomy,

PX: by sharing hormones and tapping into new systems of interdependent community -

RG: all while taking the phrase "sharing is caring" to a whole new level.

PX: WOW and what do we need to make this happen?

RG: This ladies, gentlemen, non binary, agender, and gender-non-conforming folks, is the "The Estrofemminizer  
(WOW)

PX: "The only tool a real estrogen hacker needs, to do her deeds

RG: The best part is all these ingredients are cheap and easy-to-find.

PX: Just how I like my men.

(audience laughter)

RG: It's made up of silica gel and cigarette filters layered inside a modified glass bottle.

*(text popping up on screen)*

*(close up pan bottom to up on column)*

PX: I found these items after a heavy night of drinking and smoking.

*(cut to audience laughter)*

RG (front on): Nevermind that over-priced laboratory equipment (*Jade points to a professional lab chromatography column*), this is a DIY contraption for all you biohackers out there.

PX: Whoa whoa hold up "biohacking"??? That sounds scary.

*(Text pops on screen "BIOHACKING???)*

RG: Well no, think of it as something as simple as making cheese or wine and beer. *(cut to shot of cheese, cut to shot of wine, cut to shot of beer)*

PX: OHHH SO Maria, WE HAVE ALWAYS BEEN BIOHACKERS?!!

*(cut to audience going ohhhhhhhhhhhhhhhhh)*

RG: EXACTLY Maria! Okay, to get started all we need is one more very special ingredient.

PX: And we will tell you, right after a quick but essential break!

*(show's theme song starts playing)*

*(cut to audience cheering)*

FADE TO BLACK

### **ACT III (UR-INE LUCK)**

*Shot opens with close up pan down from top of head to legs as Phoenix sits on the toilet peeing into a cup. She is humming a little tune that is the show's theme song.*

*(Mango, the show's producer pops head into bathroom)*

*Mango: Maria, it's time!*

*(Phoenix flushes, hands cup over to Mango, and bolts out the door )*

*(Show's theme song starts playing and Audience cheering)*

*(moving camera shot following behind phoenix out of bathroom and into the studio)*

*(cut to front shot as phoenix enters the studio joins renegade)*

RG: WELCOME BACK to Housewives Doing Drugs!

PX: didn't you mean housewives making drugs

RG: that's what I said

PX: So before the break Maria and I were  
just about to show you our home-made estrogen recipe

RG: All right Maria, do you have that very special ingredient?

PX AND RG look at each other:

PX: Why yes i do! Looks like You're in luck.

*(Mango the producer roller skates up with a silver platter of Urine)*

*(cut to audience laughter)*

RG: That's right! Our Urine is actually chock-full of unused hormones and with the help of the Estrofemminizer, we  
can isolate just the estrogen!

*(cut to audience going wow)*

PX: Gimme them mones!!

RG: All you need to do is wash that column down with your golden shower.

PX: My pleasure, see you soon hormones..

*(Maria takes the cup of urine and pours it down the column. Cut to close up of the liquid dripping through the column, pan  
top to down)*

PX: As we pour the urine down, the hormones, attracted to chemicals of the same kind ignore the silica gel and  
immediately move in with the cigarette filters

RG: you mean Like u-haul lesbians?

PX: Exactly! (Pause) Then from here all we have to do is get them off the filters for consumption. Tell them how  
Maria!

RG: It's easy Maria!, all we need to do is add some meth...anol (close up on bottle labeled "methanol")

*(Brandi looks into the camera)* Now folks, careful with that stuff, don't touch it, don't inhale it, and definitely don't  
drink it! ('CAUTION' text pops up on screen)

*(Brandi grabs a pipettor, sucks up some methanol and releases it down the column)*

PX: What happens if you do?

RG: well first you get drunk, then you go blind, then you throw up blood until you die.

*(Cut to close up on liquid dripping down the column)*

PX: (voice over): Now the methanol moves the hormones from here to here. All we have to do is place them in boiling  
water.

RG: the heat evaporates the methanol so we can  
isolate the estrogen, making it 100 percent safe for us to consume! It's just that simple!!! *(RG puts the hormones inside  
the pot, close up on the steam and bubbling)*

PX: Insta-mones!

RG: Who needs Obamacare, the Affordable Care Act, or the knowledge that they are actually the same thing?

PX: When we can make our own drugs with just a little biohacking magick?

*(cut to audience cheering wildly)*

RG: So as the methanol evaporates, we're going to take a quick commercial break.

PX: See you soon!

*(show's theme song starts playing)*

*(cut to audience cheering wildly)*

FADE TO BLACK

*(commercial) ESSENCE OF ESTROGEN*

## ACT IV (ESTRO-GIN)

PX and RG: Welcome back to the show!

RG: Now that the hormones are ready, we just have to dissolve them back into an alcohol of choice.

You got a favorite Maria?

PX: I sure do Maria! I love me some Gin!

RG: Perfect! let's make an ESTRO-GIN and juice!!

PX: two shots of gin... (PX pours the gin into an empty jar)

RG: And now the mones....

(RG pours the mones into the jar of gin. The jar miraculously turns pink because of the hormones)

RG: Now it's time to DRINK!

PX: But first, a reflection:

(pause, slow motion zoom onto Phoenix)

What are the ethics behind self-administering home-made hormones?

We talk about wanting body autonomy, but at what price?

(slow motion close ups of each audience face expressions contemplating)

PX: What if the recipe goes wrong? What if somebody accidentally harms themselves...

PX: With access to open source estrogen there is great power, but with that power comes greater responsibility, for myself and for our communities, comrades, and the resistance.

RG: well said Maria. Let's drink!

(The ESTRO-GIN song starts playing)

"Es-tro-gin"

"Es-tro-gin"

"Es-tro-gin"

"We take mones!"

"We take mones!"

"We take mones!"

(Choreography and singing from the audience)

Freeze

END OF COOKING SHOW

-----  
Cut back to phoenix and renegade present time still cutting hair

They pause out of imaginative scene

PHOENIX: Maybe someday

RENEGADE: Yeah, maybe

Shot glasses in hand out of nowhere

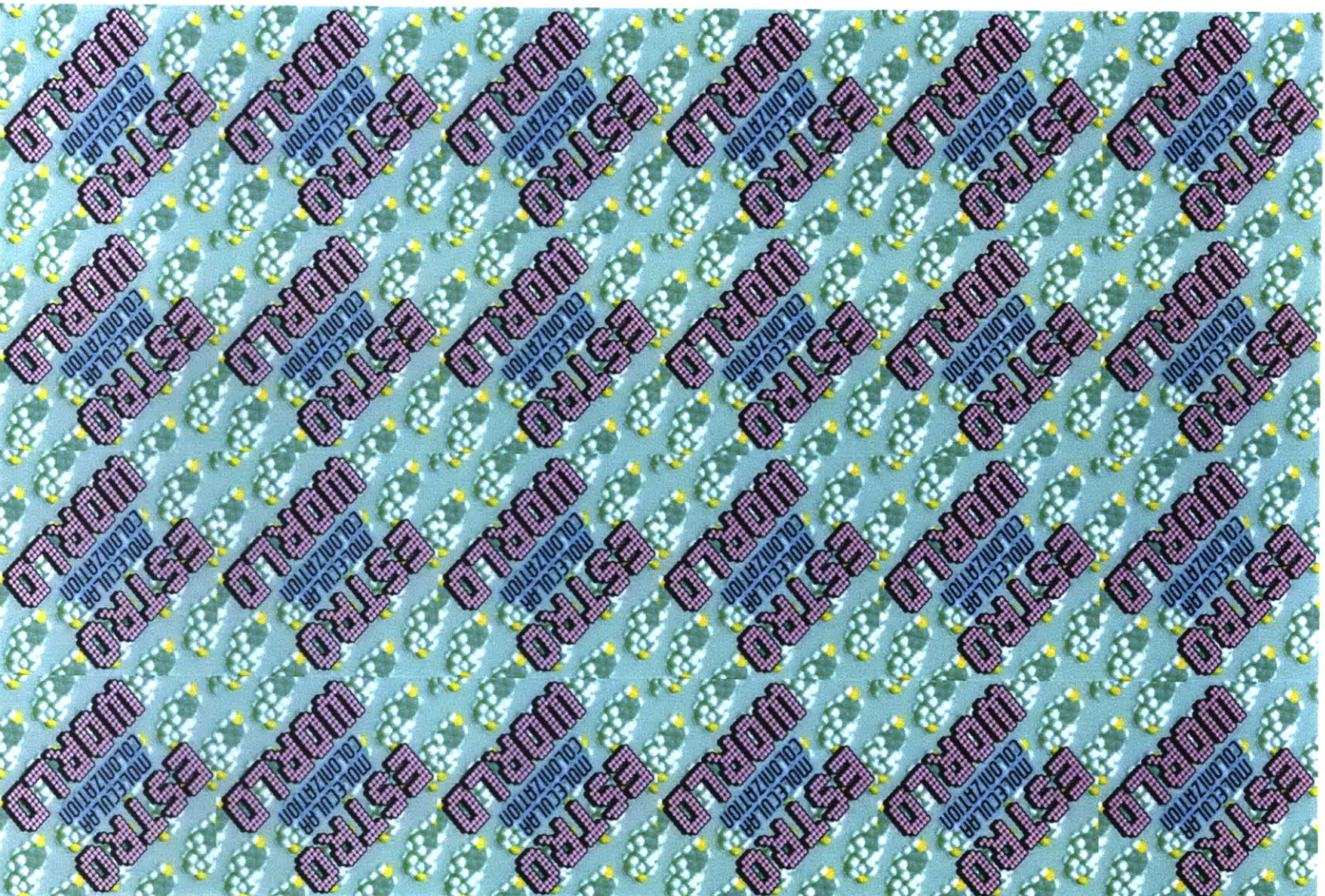
They toast

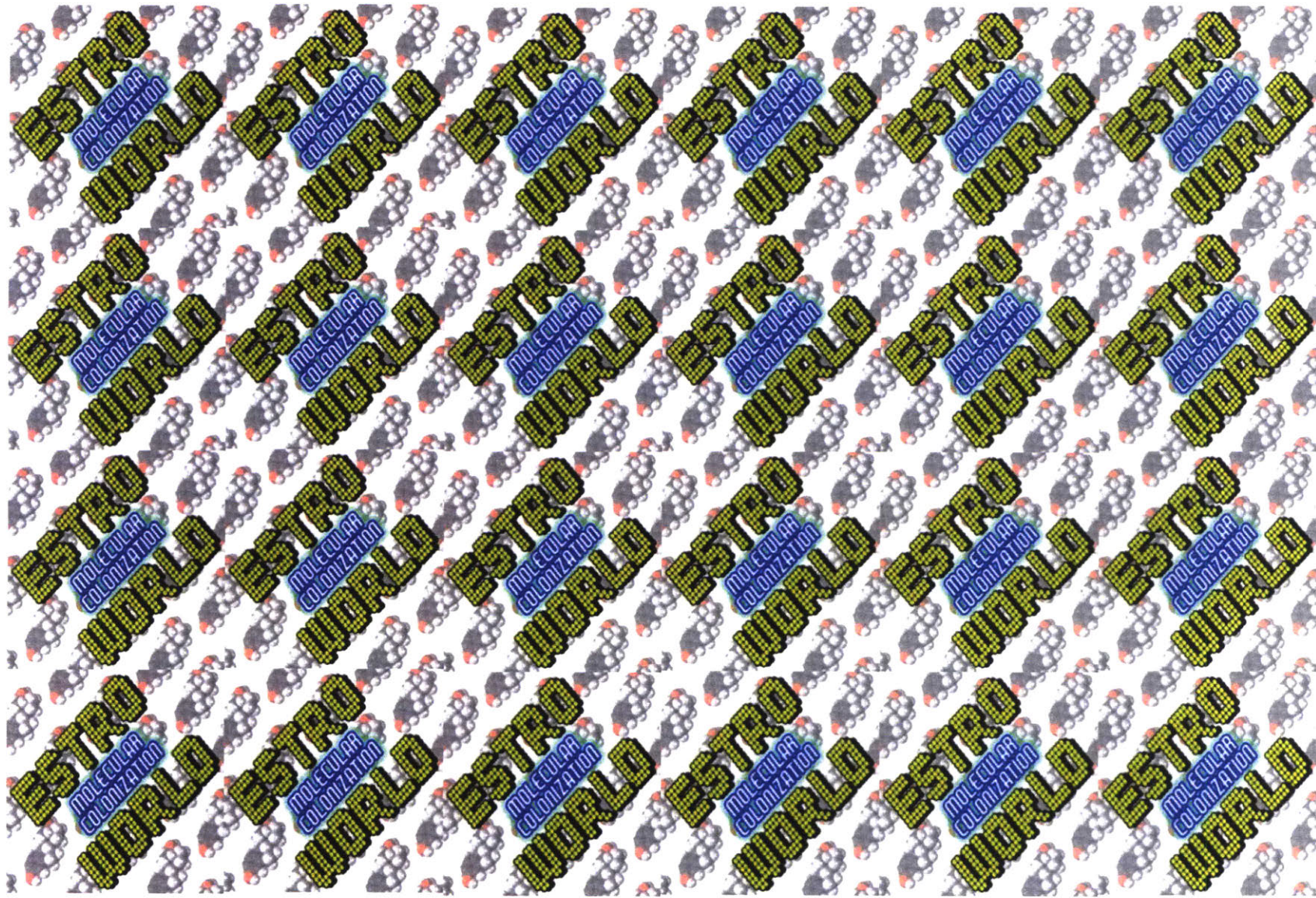
End scene

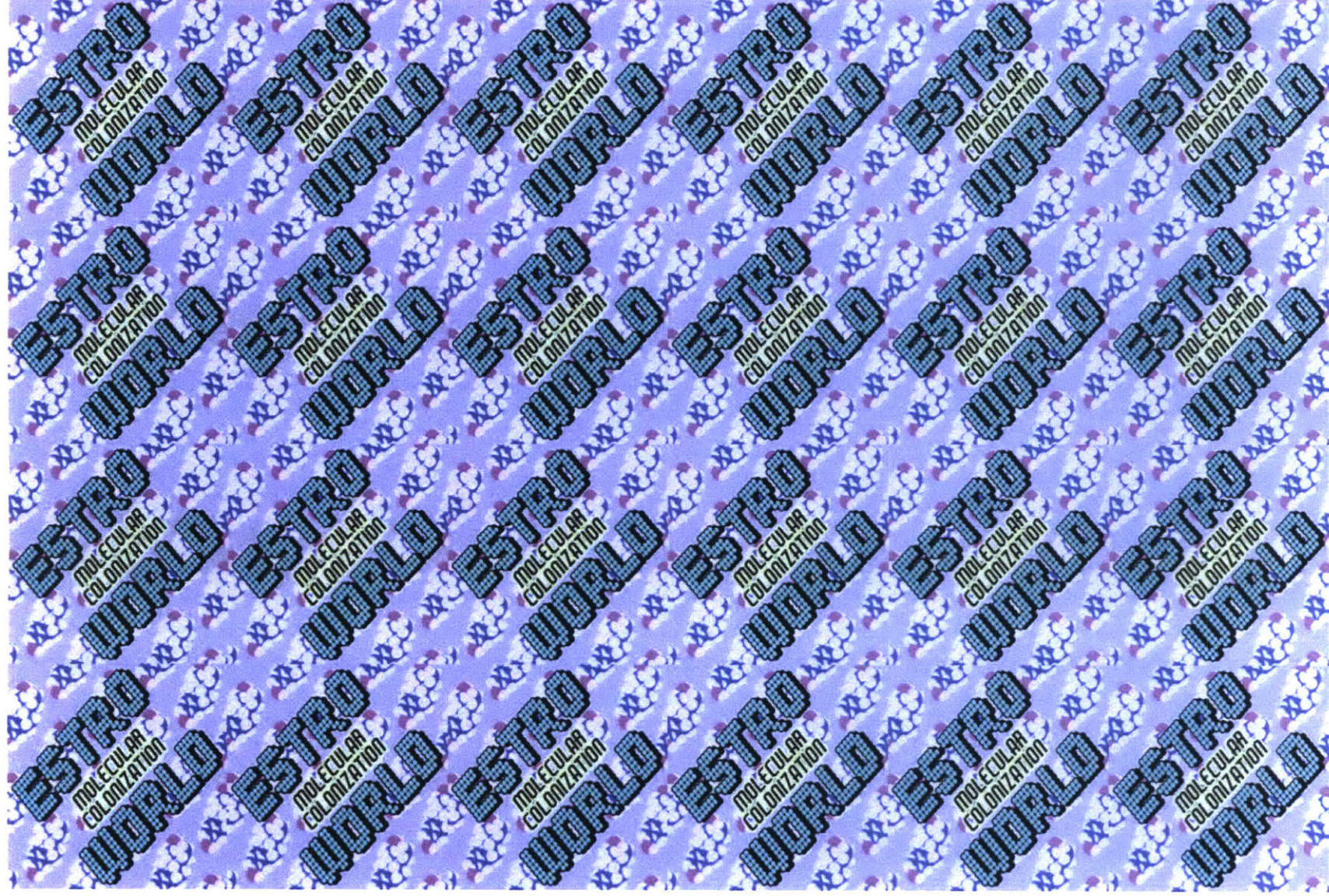
FADE TO BLACK



# Appendix 6: Stickers







ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3  
ovotestis <3 ovotestis <3 ovotestis <3

**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**  
**ovotestis <3**

