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Notes from the Endocene¹

Lenka Veselá

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The Endocene, derived from the prefix endo- (the Greek *endon* means inner or inside), transcends conventional geological perspectives to reflect on our entangled relationship with the environment. The Endocene redirects our attention to the micro-scale of our cells and molecules altered by industrial chemicals. With an emphasis on involuntary chronic exposure to endocrine disrupting chemicals affecting neurodevelopment and brain function, the Endocene examines the shifting physiology of our perception, cognition, and emotional experiences. What do our feelings,

caused and modulated by anthropogenic compounds, tell us about our synthetic becoming in the Endocene? What are the critical and political potentials of thinking with and acting upon these emotions? Using artistic research methods and drawing on visual culture studies and environmental humanities, this paper examines the intricate interplay between anthropogenic action and the biosphere, providing a critical lens through which to grasp the profound implications of industrialization on biological and emotional landscapes.

Keywords:

Anthropocene – Endocene – endocrine-disrupting chemicals – endocrine disruption – eco-emotions – affective politics – new materialism – posthumanism

The author works at the Faculty of Fine Arts, Brno University of Technology. Her research focuses on the formation of “synthetic” subjectivity, exploring controlled biotechnological interventions in organic bodies and the involuntary interactions of organisms with the techno-environment of which they are a part.

vesela@favu.vut.cz

The Anthropocene – the “Age of Man” – is a term popularized by the atmospheric chemist Paul Crutzen at the turn of the millennium. Crutzen argued that the scale of human impact on the Earth’s climate, geology and hydrosphere was so profound that we should consider introducing a new geological epoch to reflect this fundamental influence.² The term spread beyond geography to other disciplines and engendered a cultural and political awareness. It has also taken root in the field of visual culture studies, where it has been criticized for its universalizing logic that, by generalizing *anthropos*, obscures the uneven responsibility for ecosystem disruption. This in turn has instigated the emergence of alternative terms, providing a critical lens for understanding the roots of the contemporary crisis and fostering pathways for change.

With the concept of the “Endocene” I expand the alternative frameworks to include a concept that rejects the privileged status of geology as the determining force shaping the conditions of life on Earth, focuses instead on our own biochemical transformation brought about by industrial activity. The Endocene, formed by the prefix *endo-* (from the Greek *endon*, inside, within),³ highlights the ubiquity of industrial chemicals and their integration into our metabolisms. With an emphasis on chronic exposure to endocrine disruptors and the disruption they cause to the development and activity of the nervous system and brain, and consequently our perception, cognition and emotional experience, in the following text I explore the critical potential of an embodied knowledge of the Endocene. What do our feelings, caused and modulated by man-made chemicals, tell us about synthetic cohabitation in the Endocene? Can these emotions foster solidarity with those who are also affected by the harmful effects of industrial chemicals, albeit to different degrees and with varied consequences?

The Anthropocene and other (s)cenes

As visual culture theorist T. J. Demos points out in *Against the Anthropocene*, the rapid changes in the planet’s ecosystems, the effects of which disproportionately affect the poorest and least privileged and non-human nature, are not the responsibility of a collective “we,” but of unscrupulous, profiteering petro-capitalists and corporate lobbyists.⁴ In his polemic against the Anthropocene, Demos exposes the mechanisms through which the universalizing effects of the Anthropocene are realized. The generalizing and thus depoliticizing operation of the concept, he argues, is enabled and reinforced by the distinct aesthetic of Anthropocene images, which fundamentally influence what we envision when we use the term and how these visions operate in the world. Technology-enabled visualizations of the Anthropocene not only help to illustrate geological concepts, but also frame them in ways that are inherently political, without considering the significant

- 2 Paul CRUTZEN, “Geology of Mankind,” *Nature*, Vol. 415, 2002, No. 6867, p. 23; Paul CRUTZEN – Eugene F. STOERMER, “The Anthropocene: How Can We Live in a World Where There is No Nature Without People?,” in: Libby ROBIN – Sverker SÖRLIN – Paul WARDE (eds.), *The Future of Nature*, New Haven: Yale University Press 2020, pp. 479–490; Paul J. CRUTZEN – Eugene F. STOERMER, “The Anthropocene,” *Global Change Newsletter*, Vol. 41, May 2000, pp. 17–18.
- 3 Josef ŠIMANDL (ed.), *Slovník afixů užívaných v češtině*, Praha: Ústav pro jazyk český AV ČR, heslo 222/1097 ento-/endo-, <https://www.slovníkafixu.cz/heslar/ento-/endo-> (accessed 22 February 2024).
- 4 T. J. DEMOS, *Against the Anthropocene: Visual Culture and Environment Today*, Berlin: Sternberg Press 2017.

ethical and political implications of such framing – from the iconic photograph of the Earth as a “blue marble,” which helped reinforce the notion of a unified planetary identity, to contemporary visualizations of remotely collected satellite data that obscure more than they illuminate, especially in terms of the unevenly distributed responsibility for the planetary crisis and the inequitably borne consequences thereof. Demos opens his critique of the Anthropocene with the following questions:

How does this new epoch – if it is indeed granted epoch-status – and its discursive framework relate to image technologies, including the photographic, the video-based, the satellite-imaged, the website-delivered, and the network-dispersed? How is the Anthropocene thesis – for it remains for now a proposition that demands critical testing – abetted or contradicted by different kinds of visualizations, and how might artistic-activist practices not only confirm but also provide compelling alternatives to adopting its rhetoric?⁵

A host of emerging concepts offer alternative frameworks for imagining and articulating planetary change. One of the earliest alternatives to the thesis of the Anthropocene was Jason W. Moore’s Capitalocene, which argues that it is not *anthropos*, a vague, collective human agent, but capital which is the true driver and culprit of climate disruption.⁶ Moore’s argument that we should consider the age of Capital rather than the age of “Man” also counters the technological determinism of mainstream narratives of the Anthropocene, which link it to industrial progress and the rise of fossil fuels. While geologists usually trace the beginning of the Anthropocene back to the Industrial Revolution and the invention of the steam engine, the Capitalocene, along with related concepts such as the Plantationocene attributed to Anna Tsing⁷ and the Eurocene of Jairus Victor Grove,⁸ place it in the dawn of capitalism and the rise of the conquistadorial efforts of modern colonial powers. At the same time, they challenge the common belief that technological progress via more sustainable technologies and resources can alone guarantee a turn for the better. They argue that a redemptive turn will not come about without a fundamental rethinking of power dynamics and cultural relations, including interspecies relations and more-than-human forms of coexistence.

Similarly, Kathryn Yusoff, in her book “Black Anthropocenes,” explores the interconnectedness of the Earth’s geological life with extractive economies, colonialism and slavery, tracing the causes of ecological disruption back to the extractive logic of European

5 *Ibid.*, p. 9.

6 Jason W. MOORE (ed.), *Anthropocene or Capitalocene? Nature, History, and the Crisis of Capitalism*, Oakland: PM Press 2016.

7 Anna LOWENHAUPT TSING, “A Threat to Holocene Resurgence is a Threat to Livability,” in: Marc BRIGHTMAN – Jerome LEWIS (eds.), *The Anthropology of Sustainability: Beyond Development and Progress*, London: Palgrave 2017, pp. 51–65; Anna LOWENHAUPT TSING – Nils BUBANDT – Elaine GAN – Heather Anne SWANSON (eds.), *Arts of Living on a Damaged Planet*, Minneapolis: University of Minnesota Press 2017; Anna LOWENHAUPT TSING – Jennifer DEGER – Alder KELEMAN SAXENA – Feifei ZHOU (eds.), *Feral Atlas. The More-Than-Human Anthropocene*, Stanford: Stanford University 2021.

8 Jairus Victor GROVE, *Savage Ecology: War and Geopolitics at the End of the World*, Durham – London: Duke University Press 2019.

colonialism and capitalist modernity.⁹ Charles C. Mann's Homogenocene¹⁰ and Edward O. Wilson's Eremocene,¹¹ like the Plantationcene, highlight the loss of biodiversity due to the forced domination and exploitation of nature. Donna Haraway's Chthulucene,¹² Glenn Albrecht's Symbiocene¹³ and Bernard Stiegler's Neganthropocene¹⁴ then reflect on the loss of species richness and the decline of ecosystem diversity, while envisioning pathways towards a restoration of life-sustaining interspecies relationships and the regenerative capacities of complex, more-than-human ecologies. Jussi Parikka's Anthrobscene,¹⁵ Alf Hornborg's Technocene,¹⁶ or the Plasticene, associated, for instance, with the recent book *Plastic Matter* by the cultural theorist Heather Davis,¹⁷ in turn reveal the broader context of material relations in techno-capitalism by pointing to the agency of man-made materials and technologies, which, contrary to modernist assumptions of their malleability and manipulability, become planetary agents in their own right.

The Endocene – the Anthropocene in/of us

Building on concepts that foster alternative imaginaries, sensibilities and sensitivities shaped by planet-wide but unevenly experienced and endured environmental changes, I propose the concept of the Endocene as a counter-narrative that redirects attention to the transformative power of human-induced biochemical processes. In doing so, I shift the focus from the macroworld of geological movements to the microworld of cellular and molecular interactions, the effects of which are felt in our everyday lived experiences. When reflecting upon the Endocene, I am responding to a critique by the cultural environmentalist Stacy Alaimo, who challenges the privileged role of geology as a determining factor in changing the conditions of planetary life.¹⁸ “[T]he geological origins of the term *Anthropocene* have spawned stark terrestrial figurations of man and rock in which other life-forms and biological processes are strangely absent,”¹⁹ writes Alaimo, adding that “the focus on geology, rather than, say, chemistry or biology may segregate the human

- 9 Kathryn YUSOFF, *A Billion Black Anthropocenes or None*, Minneapolis: University of Minnesota Press 2018.
- 10 Charles C. MANN, *1493: Uncovering the New World Columbus Created*, New York: Alfred A. Knopf 2011.
- 11 Edward O. WILSON, “Beware the Age of Loneliness,” *The Economist*, 18 November 2013, <https://www.economist.com/news/2013/11/18/beware-the-age-of-loneliness> (accessed 3 October 2023).
- 12 Donna J. HARAWAY, *Staying with the Trouble: Making Kin in the Chthulucene*, Durham: Duke University Press 2016.
- 13 Glenn ALBRECHT – Gavin VAN HORN, “Exiting the Anthropocene and Entering the Symbiocene,” *Humans and Nature*, 24 May 2016, <https://humansandnature.org/exiting-the-anthropocene-and-entering-the-symbiocene/> (accessed 3 February 2023).
- 14 Bernard STIEGLER, *The Neganthropocene*, London: Open Humanities Press 2018.
- 15 Jussi PARIKKA, *Anthrobscene*, Minneapolis: University of Minnesota Press 2015.
- 16 Alf HORNBERG, “The Political Ecology of the Technocene: Uncovering Ecologically Unequal Exchange in the World-System,” in: Clive HAMILTON – François GEMENNE – Christophe BONNEUIL (eds.), *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, London: Routledge 2015, pp. 57–69.
- 17 Heather DAVIS, *Plastic Matter*, Durham – London: Duke University Press 2022.
- 18 Stacy ALAIMO, “Your Shell on Acid: Material Immersion, Anthropocene Dissolves,” in: Richard GRUSIN (ed.), *Anthropocene Feminism*, Minneapolis: University of Minnesota Press 2017, pp. 89–120. Chapter taken from: Stacy ALAIMO, *Exposed: Environmental Politics and Pleasures in Posthuman Times*, Minneapolis – London: University of Minnesota Press 2016.
- 19 ALAIMO, “Your Shell on Acid,” p. 89, or ALAIMO, *Exposed*, p. 143.

from the anthropogenic alterations of the planet by focusing on an externalized and inhuman sense of materialist.”²⁰ Alaimo attributes the omission of biological processes, phenomena and actors in common interpretations of the Anthropocene not only to the term’s geological roots, but also to the particular aesthetics of Anthropocene images.

Like Demos, Alaimo also notices the characteristic perspective “from above” or “from nowhere” in these images, which offers the (un)placed observer a breathtaking spectacle of a planet transformed by humankind. Drawing on the work of feminist scholar Donna Haraway, Alaimo underscores the profound ethical and political implications of such a view, which, under the guise of neutrality, promotes a particular position (male, white, heterosexual) as universal.²¹ This move, which Haraway describes as “God’s trick,” Alaimo argues exposes the conquistadorial view of human settlements, industrial and commercial zones, and transportation networks, while rendering invisible the trajectories and agency of other planetary actors:

Where is the map showing the overlapping patterns of whale migrations with shipping and military routes? Or the sonic patterns of military and industrial noise as it reverberates through areas populated by cetaceans? Or established bird migration routes, many of which have been rendered inhospitable to avian life? The movements, the activities, the liveliness of all creatures, except for the human, vanish.²²

Last but by no means least, in considerations of the *anthropos* as an abstract geological force, actual human beings disappear, despite being vulnerable flesh-and-bone creatures who do not stand outside planetary processes but are deeply embedded in them. In response to this, the concept of the Endocene highlights the living human body as a site of transformation shaped by the Industrial Revolution and the rise of capitalism. The Endocene – the Anthropocene in/of us – builds on the concept of the “Anthropocene in/of the cell” developed by the sociologist and historian of science Hannah Landecker.²³ Drawing on recent discoveries in epigenetics and epidemiology, Landecker demonstrates how the laying bare of increasingly complex mechanisms through which social, ecological and interspecies relationships are inscribed in the biology of organisms subverts familiar notions of the relationship between organism and environment – what we might call the “inside” and the “outside” of an organism and where exactly its boundaries lie. Using the examples of antimicrobial resistance and epigenetic changes in human cells caused by the industrial use of arsenic as an antiparasitic and growth stimulant added to livestock feed,

20 ALAIMO, “Your Shell on Acid,” p. 94, or ALAIMO, *Exposed*, p. 148.

21 DONNA HARAWAY, “Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective,” *Feminist Studies*, Vol. 14, 1988, No. 3, pp. 575–599.

22 ALAIMO, “Your Shell on Acid,” p. 92, or ALAIMO, *Exposed*, pp. 145–146.

23 Landecker introduced the concept of the “Anthropocene in the cell” or “Anthropocene of the cell” in lectures given during the preparation of a unpublished book *American Metabolism*. Here I draw on her Prague lecture “The Industrialization of Metabolism: Histories and Consequences,” Prague, Institute of Sociology, Czech Academy of Sciences, 25 May 2022, <https://www.soc.cas.cz/akce/industrialization-metabolism-histories-and-consequences> (accessed 2 February 2023). An excerpt from the forthcoming book was published in a Czech translation by Miluř Kotišová: Hannah LANDECKER, “Metabolická energie: Antioxidanty, elektronové ekonomiky a dlouhodobá nepřetržitá práce,” *Academix revue*, Vol. 2, 2023, No. 3, p. 54–57.

Landecker highlights the unintended consequences of biotechnological interventions that appear successful in the short term but lead to unpredicted irreversible changes in biological systems over time.²⁴

Drawing on Landecker's work, I propose using the concept of the Endocene to underscore the pressing issues posed by the pervasive presence of man-made chemicals and their impact on metabolisms and reproductive mechanisms. While the Anthropocene as a phenomenon relating to geological substrates, rock layers, marine sediments, polar ice caps and greenhouse gases impacts us from the outside through cascading effects on the environment, the Endocene focuses on the industrialization of cellular and molecular landscapes, instigating processes that originate and evolve within us. The concept of the Endocene entreats us to shift our gaze from the macro to the micro level and from the outside to the inside to appreciate a perspective that, rather than contemplating the impending collapse of life on Earth, examines the biochemical transformation already underway within our bodies, as well as the industrialization of the metabolisms and metabolic relationships of other planetary species without which our survival is unthinkable.

Finally, the concept of the Endocene I develop stems from my research into co-existence with chemical endocrine disruptors, which are environmentally ubiquitous compounds that interfere with the synthesis, secretion, transport, binding, action and excretion of hormones produced by the body.²⁵ In multicellular organisms, hormones act as "chemical messengers," as Ernst Starling termed them in 1905,²⁶ which link the nervous system and bodily functions, thereby influencing the functioning of organs and tissues. Endocrine disruptors can interfere with hormonal systems through a myriad of complex mechanisms, the most debated of which is their ability to bind to hormone receptors and mimic the action of physiological hormones. The ubiquitous presence and persistence of

- 24 Hannah LANDECKER, "Antibiotic Resistance and the Biology of History," *Body & Society*, Vol. 22, 2016, No. 4, pp. 19–52; Hannah LANDECKER, "Trace Amounts at Scale: Arsenicals, Medicated Feed, and the 'Western Diet,'" in: Angela N. H. CRAGER – Jean-Paul GAUDELLIÈRE (eds.), *Risk at the Table: Food Production, Health, and the Environment*, New York – Oxford: Berghahn 2021, pp. 187–213.
- 25 Lenka VESELÁ, *Syntetická těla* [PhD thesis], Brno: FaVU VUT 2023; Lenka VESELÁ, "Getting Angry With Endocrine Disrupting Chemicals," *Matter: Journal of New Materialist Research*, Vol. 7, 2023, pp. 63–85; Lenka VESELÁ (ed.), *Synthetic Becoming*, Brno – Berlin: FaVU VUT – K. Verlag 2022; Lenka VESELÁ, "Chemický antropocén," *Flash Art, Czech and Slovak Edition*, Vol. 66, December 2022 / March 2023, <https://flashart.cz/2023/02/02/chemicky-antropocen/> (accessed 2 April 2023).
- 26 Following the discovery of the hormone secretin, which he isolated and named along with William Bayliss, Starling gave the hormones their name (hormone – from the Greek ὁρμή [hormé], which denotes a violent forward movement, or from the verb ὀρμῶ [hormó], which means "to set in motion," "to stimulate"). He described them as chemical transmitters formed in endocrine glands that circulate in the blood and inform the activity of organs and the tissues of multicellular organisms. Ernest Henry STARLING, "The Croonian Lectures. I. On the Chemical Correlation of the Functions of the Body," *Lancet*, Vol. 166, 1905, No. 4276, pp. 423–425.

these compounds, from microplastics in the depths of the ocean,²⁷ via decomposition-resistant per- and polyfluoroalkyl substances (PFAS) in polar ice caps,²⁸ to bisphenol A (BPA) in placenta and breast milk,²⁹ raises concerns about their potential impacts on both human and non-human life. Today, no corner of the Earth remains untouched by these chemicals with the ability to “hack” our chemical information system.

In addition to bisphenol A, which is found in plastic bottles, food containers, can linings, and thermal paper used for ATM and shopping receipts, other known chemical endocrine disruptors include everyday consumer products such as phthalates and parabens in cosmetics and cleaning products, ultraviolet (UV) filters in sunscreen products, and brominated flame retardants in home textiles, furniture and electronics. Examples of industrial applications include polychlorinated biphenyls (PCBs) used in refrigeration, insulation and lubrication systems or as additives in paints, adhesives and waxes. PCBs belong to the group of persistent organic pollutants (POPs), which are chemicals with a high resistance to degradation, among which are certain pesticides such as insecticides.

PFAS, often referred to as “forever chemicals” due to their persistence, are used in food packaging, kitchenware and outdoor fabrics and home textiles for their waterproof and non-stick properties, and are also persistent organic pollutants. Endocrine-disrupting chemicals are also released during oil and gas extraction, notably through hydraulic fracturing, where a pressured mixture of water, sand and chemicals is pumped deep below the Earth’s surface to break up shale rock layers in order to access hard-to-reach fossil deposits. Additionally, some pharmaceutical products can disrupt hormonal systems. Besides the known side effects of hormonal drugs such as hormonal contraceptives or hormone replacement therapy, non-hormonal products such as those containing paracetamol and a

- 27 Lisbeth VAN CAUVENBERGHE – Ann VANREUSEL – Jan MEES – Colin R. JANSSEN, “Microplastic Pollution in Deep-Sea Sediments,” *Environmental Pollution*, Vol. 182, November 2013, pp. 495–499; Justine BARETT – Zanna CHASE – Jing ZHANG – Mark BANASZAK HOLL – Kathryn WILLIS – Alan WILLIAMS – Britta D. HARDESTY – Chris WILCOX, “Microplastic Pollution in Deep-Sea Sediments From the Great Australian Bight,” *Frontiers in Marine Science*, Vol. 7, October 2020, <https://doi.org/10.3389/fmars.2020.576170> (accessed 3 February 2023); Eoghan M. CUNNINGHAM – Sonja M. EHLERS – Jaimie T. A. DICK – Julia D. SIGWART – Katrin LINSE – Jon J. DICK – Konstadinos KIRIAKOULAKIS, “High Abundances of Microplastic Pollution in Deep-Sea Sediments: Evidence from Antarctica and the Southern Ocean,” *Environmental Science & Technology*, Vol. 54, 2020, No. 21, pp. 13661–13671.
- 28 Derek MUIR – Rossana BOSSI – Pernilla CARLSSON – Marlene EVANS – Amila DE SILVA – Crispin HALSALL – Cassandra RAUERT – Dorte HERZKE – Hayley HUNG – Robert LETCHER – Frank RIGÉTT – Anna ROOS, “Levels and Trends of Poly- and Perfluoroalkyl Substances in the Arctic Environment – An Update,” *Emerging Contaminants*, Vol. 5, 2019, pp. 240–271; Jack GARNETT – Crispin HALSALL – Anna VADER – Hanna JOERSS – Ralf EBINGHAUS – Amber LEESON – Peter M. WYNN, “High Concentrations of Perfluoroalkyl Acids in Arctic Seawater Driven by Early Thawing Sealce,” *Environmental Science & Technology*, Vol. 55, 2021, No. 16, pp. 11049–11059; Zhiyong XIE – Zhen WANG – Wenying MI – Axel MÖLLER – Hendrik WOLSCHKE – Ralf EBINGHAUS, “Neutral Poly-/Perfluoroalkyl Substances in Air and Snow from the Arctic,” *Scientific Reports*, Vol. 5, March 2015, <https://doi.org/10.1038/srep08912> (accessed 3 February 2023).
- 29 Jangwoo LEE – Kyungho CHOI – Jeongim PARK – Hyo-Bang MOON – Gyuyeon CHOI – JeongJae LEE – Eunsook SUH – Hai-Joong KIM – So-Hee EUN – Gun-Ha KIM – GeumJoon CHO – SungKoo KIM – Sungjoo KIM – SuYoung KIM – Seunghyo KIM – Soyong EOM – Sooran CHOI – Young Don KIM – Sungkyoon KIM, “Bisphenol A Distribution in Serum, Urine, Placenta, Breast Milk, and Umbilical Cord Serum in a Birth Panel of Mother-Neonate Pairs,” *The Science of the Total Environment*, Vol. 626, June 2018, pp. 1,494–1,501.

host of other drugs from a wide range of antipsychotics, anticonvulsants, diabetes medication, antivirals, and other drugs also pose potential risks.

Hormonal dysfunction caused by endocrine disruptors can take the form of various chronic and acute conditions, including fertility issues, metabolic disorders, impaired growth and sleep disturbances, as well as neurobiological effects, affecting our thoughts and experiences, which are central to my research. By localizing the effects of industrial chemicals in our feelings of sadness, irritability, anxiety, distractedness, futility and hopelessness, I aim to highlight the immediate and visceral consequences of anthropogenic chemical pollution. Even minor hormonal imbalances have noticeable effects on our emotional states, and while these emotional disruptions, unlike many other outcomes of endocrine disruption, may not pose a direct threat to life, they are still significant and warrant our attention. The effects of endocrine disruptors perceptible at the intimate level of our thoughts, feelings and motivations are an important, albeit partial and unreliable source of knowledge of the Endocene, demonstrating clearly how closely and intimately our bodies are intertwined with the global production of synthetic chemicals.

ANTHROPOCENE	ENDOCENE
	Anthropocene in/of us
emphasis on geology climate change	emphasis on biology endocrine disruption
macro-scale of planetary processes deep geological time hyperobject	micro-level of cells and molecules lived experience situated subjects
hidden, slow violence downstream effects of global changes adaptation to environmental changes	emergent, becoming unfolds within us absorption and secretion
<i>zooming out</i> distant perspective separating	<i>zooming in</i> perceiving changes within connecting
contemplation of planetary catastrophe comfortable distance apocalyptic sublime	immersion claustrophobic, disorienting mundane

A comparison of the starting points, dynamics and aesthetic understanding of the Anthropocene in its prevailing interpretation with an alternative conception of the Endocene developed on the basis of my research.

Endocrine disruption as an index of the Endocene

Exposure to endocrine-disrupting chemicals in the early stages of human development and throughout life has been associated with growing rates of premature puberty, lower sperm counts, genital malformations, infertility and pregnancy complications. In addition to these frequently cited, discussed and researched effects on sexual and reproductive development

and related functions, chemical endocrine disruptors also act as carcinogens, increasing the risk of hormonal cancers in humans and animals.³⁰ However, the effects of endocrine disruptors on sexuality and reproduction have received more peer-reviewed articles and media attention than their carcinogenic effects, despite the fact that many of these well-documented and suspected effects are esthetic in nature (benign enlargement of the mammary glands in men, increased body hair in women, the size and shape of the genitals), or impact intimate and social life (controversial but widely publicized effects on sexual preferences, gender identification and neurobiological characteristics, such as a preference for certain play activities or the ability to navigate space),³¹ but do not directly threaten human health or survival.

Respected scientific studies and media reports highlight the anomalies in sexual development and reproductive behavior caused by chemical endocrine disruptors as key evidence documenting their harmfulness. When doing so, they often resort to terms such as “chemical castration” or “gender-bending chemicals,” as well as to descriptions of the toxic effects of endocrine disruptors using adjectives referring to feminization, homosexuality and transgenderism.³² Through my research, I aim to challenge the normative assumptions that frame discussions of endocrine disruptors in ways that perpetuate heterosexist and transphobic sentiments, while also making endocrine disruption visible as a complex bio-social phenomenon.

- 30 “Endocrine Disruptors and Hormone-Related Cancers,” in: Åke BERGMAN – Jerrold J. HEINDEL – Susan JOBLING – Karen A. KIDD – R. THOMAS (eds.), *State of the Science of Endocrine Disrupting Chemicals 2012: Summary for Decision-Makers*, United Nations Environment Programme and World Health Organization 2013, pp. 126–142, <https://apps.who.int/iris/handle/10665/78102> (accessed 30 March 2023); Ana M. SOTO – Carlos SONNENSCHNEIN, “Environmental Causes of Cancer: Endocrine Disruptors as Carcinogens,” *Nature Reviews: Endocrinology*, Vol. 6, 2010, No. 7, pp. 363–370.
- 31 ERNIE HOOD, “Are EDCs Blurring Issues of Gender?,” *Environmental Health Perspectives*, Vol. 113, 2005, No. 10, pp. A670–677.
- 32 For more on this theme, see for example Malin AH-KING – Eva HAYWARD, “Toxic Sexes: Perverting Pollution and Queering Hormone Disruption,” in: VESELÁ, *Synthetic Becoming*, pp. 20–31; Lynda BIRKE, “Sitting on the Fence: Biology, Feminism and Gender-Bending Environments,” *Women’s Studies International Forum*, Vol. 23, 2000, No. 5, pp. 587–599; Giovanna DI CHIRO, “Polluted Politics? Confronting Toxic Discourse, Sex Panic, and Eco-Normativity,” in: Catriona MORTIMER-SANDILANDS – Bruce ERICKSON (eds.), *Queer Ecologies: Sex, Nature, Politics, Desire*, Bloomington: Indiana University Press 2010, pp. 199–230; Eva HAYWARD, “Transxenoestrogenesis,” *Transgender Studies Quarterly*, Vol. 1, 2014, Nos. 1–2, pp. 255–258; Bailey KIER, “Interdependent Ecological Transsex: Notes on Re/production, ‘Transgender’ Fish, and the Management of Populations, Species, and Resources,” *Women & Performance: A Journal of Feminist Theory*, Vol. 20, 2010, No. 3, pp. 299–319; Robyn LEE – Roxanne MYKITIUK, “Surviving Difference: Endocrine-Disrupting Chemicals, Intergenerational Justice and the Future of Human Reproduction,” *Feminist Theory*, Vol. 19, 2018, No. 2, pp. 205–221; Logan Natalie O’LAUGHLIN, “Interrogating Ecofeminisms: Reading Endocrine Disruptor Panics as Assemblages,” *Green Theory and Praxis*, Vol. 9, 2016, No. 6, pp. 25–38; Logan Natalie O’LAUGHLIN, “Troubling Figures: Endocrine Disruptors, Intersex Frogs, and the Logics of Environmental Science,” *Catalyst: Feminism, Theory, Technoscience*, Vol. 6, 2020, No. 1, pp. 1–28; Meg PERRET, “‘Chemical Castration’: White Genocide and Male Extinction in Rhetoric of Endocrine Disruption,” *NiCHE, Network in Canadian History & Environment*, 9 June 2020, <https://niche-canada.org/2020/06/09/chemical-castration-white-genocide-and-male-extinction-in-rhetoric-of-endocrine-disruption/> (accessed 13 April 2023); Anne POLLOCK, “Queering Endocrine Disruption,” in: Katherine BEHAR (ed.), *Object-Oriented Feminism*, Minneapolis: University of Minnesota Press 2016, pp. 183–99; Dayna Nadine SCOTT, “‘Gender-Benders’: Sex and Law in the Constitution of Polluted Bodies,” *Feminist Legal Studies*, Vol. 17, 2009, No. 3, pp. 241–265.

Drawing on posthumanism, new materialism and material feminisms, and guided by queer ecological approaches, I trace how the effects of chemical endocrine disruptors unfold differentially and performatively in situated interactions with compounds synthesized in laboratories and industrial plants, as well as within the bodies of human and non-human organisms. To the extent that we can understand the Endocene as an epoch characterized by the unprecedented interconnectedness of our endocrine system with the global networks of the chemical and pharmaceutical industries, we must frame research into the biochemical effects of chemicals with a critical awareness of our complex and by no means innocent socio-political relations. Assessing the impact of endocrine disruption on our bodies requires confronting vital issues such as informed consent, gender norms, extractivism, consumerism and complicity, which are also implicated in our becoming within the intertwined web of biochemically active molecules and inequitable capitalistic relations.

My research examines the combined and interactive effects of hormonally active substances, particularly in relation to their potential impact on our subjective experience and perception. The starting point is my own experience with the long-term use of hormonal contraceptives in a continuous regime, which maintains a stable level of hormones, which would otherwise fluctuate during the physiological menstrual cycle or during the weekly break in the use of contraceptive hormones, causing mood changes. I use my experience of taking synthetic hormones, which helped to alleviate the anxiety and depressive states I suffered from, especially in adolescence, as a lens through which to grasp the broader issue of environmental endocrine disruptors. If synthetic hormones can profoundly affect how we feel, what impact might industrial chemicals, omnipresent in the environment and capable of affecting our hormones, have on our emotional states?

A broader starting point centers on the fact that, while the influence of chemical endocrine disruptors on our emotions and psychological wellbeing is seldom discussed, emotional symptoms are at the heart of the debate surrounding physiological hormones. Fluctuations in endogenous (naturally occurring) hormones during puberty, pregnancy, menopause and throughout the menstrual cycle have long been associated with sensory, cognitive and emotional changes. Symptoms such as anxiety, irritability, moodiness, difficulty in maintaining attention, fatigue, lethargy, insomnia, depression or paranoia are commonly linked by both professionals and the lay public to hormonal changes in the female (and to a far lesser extent male) body. Possible adverse effects on the senses, emotions and cognitive abilities are also discussed in connection with hormonal medications, with these effects cited as common “side” effects of hormonal contraception, hormonal replacement therapy or hormone-based infertility treatments. The impact of endogenous hormones or hormonal treatments on our emotional experience and brain function has

been documented in scientific studies.³³ In addition, the numerous testimonies of those who have experienced changes in their emotional and mental state caused by hormone fluctuations or as a result of taking hormonal drugs, shared with loved ones and on discussion forums, attest to the profound influence that hormones – physiological and synthetic – have on our emotions. Notably, many popular menstrual cycle tracking apps include mood tracking features.

In addition to working from my lived experience, I incorporate insights gleaned from participatory workshops in which we collectively explored the changing nature and needs of our lives affected by involuntary chemical exposure. These workshops, which took place in October and November 2022, connected discussions examining the potential psychological impact of chemicals with broader debates on the ecology of our emotions. The participants were university students and graduates from non-artistic fields who responded to an open call. To facilitate the workshop, I created a speculative tool called the *Endocrine Disruption Tracker Tool* (EDTT), which tracks emotional symptoms induced or modulated by endocrine disruptors. The EDTT takes the form of a booklet with a tracking chart, for recording observations of emotional symptoms over a period of ten days. During this period, the research participant notes their own emotions, as well as the emotions of loved ones and other people with whom they come into contact. How are individual emotions experienced? How do they affect everyday life and wellbeing? How are they shared? What is their origin? The participant reflects on the causes of mood changes, discomfort or irritation, taking into account the possible influence of chemical exposure on the emergence of emotions and the intensity with which they are felt.

The EDTT is modeled after a similar tool used for the diagnosis of premenstrual syndrome and premenstrual dysphoric disorder. These disorders are caused by hormonal fluctuations in the second half of the menstrual cycle and during the first few days of menstruation, leading to a range of physical and emotional symptoms, with emotional issues causing greater harm than physical ones. The EDTT is based on the 2021 version of this premenstrual symptom tracking tool developed by the International Association for

- 33 Hudson HOAGLAND (ed.), *Hormones, Brain Function, and Behavior*, New York: Academic Press 1957; David WIED – Pieter A. KEEP (eds.), *Hormones and the Brain*, Lancaster: MTP Press Limited 1980; Ellen W. FREEMAN – Mary D. SAMMEL – Li LIU – Clarisa R. GARCIA – Deborah B. NELSON – Lori HOLLANDER, “Hormones and Menopausal Status as Predictors of Depression in Women in Transition to Menopause,” *Archives of General Psychiatry*, Vol. 61, 1980, No. 1, pp. 62–70; Jeanne BROOKS-GUNN – Julia A. GRABER – Roberta L. PAIKOFF, “Studying Links Between Hormones and Negative Affect: Models and Measures,” *Journal of Research on Adolescence*, Vol. 4, 1994, No. 4, pp. 469–486; Louise GOLIGHTLY – Allan YOUNG, “Sex Hormones and Mental Health,” *Advances in Psychiatric Treatment*, Vol. 5, 1999, No. 2, pp. 126–134; Claude KORDON – Rolf-Christian GAILLARD – Yves CHRISTEN (eds.), *Hormones and the Brain*, Berlin – Heidelberg – New York: Springer 2005; Linda M. RIO (ed.), *The Hormone Factor in Mental Health: Bridging the Mind-Body Gap*, London – Philadelphia: Jessica Kingsley Publishers 2013; Elena TOFFOL – Oskari HEIKINHEIMO – Timo PARTONEN, “Associations Between Psychological Well-Being, Mental Health, and Hormone Therapy in Perimenopausal and Postmenopausal Women: Results of Two Population-Based Studies,” *Menopause*, Vol. 20, 2013, No. 6, pp. 667–676; Kristine MARCEAU – Paula L. RUTTLE – Elizabeth A. SHIRTCLIFF – Marilyn J. ESSEX – Elizabeth J. SUSMAN, “Developmental and Contextual Considerations for Adrenal and Gonadal Hormone Functioning During Adolescence: Implications for Adolescent Mental Health,” *Developmental Psychobiology*, Vol. 57, 2015, No. 6, pp. 742–768.

Premenstrual Disorders (IAPMD).³⁴ It uses an identical set of ten emotional symptoms,³⁵ but modifies the original design by expanding the tool's functions to include symptoms resulting not only from fluctuations in endogenous hormones, but from the complex interplay of physiological hormones, synthetic hormones, and endocrine-disrupting chemicals.

The EDTT does not enable us to isolate the specific action of endocrine disruptors and thus determine if and when their influence is reflected in emotions, but speculates about endocrine disruption within a broader (dis)harmony of hormonally active molecules. The following comments were made during one of the project presentations by a participant expressing skepticism regarding the possibility of attributing changes in emotional states and moods to environmental endocrine disruptors in the same way as they are habitually attributed to the effects of endogenous hormones or hormonal drugs:³⁶

When I began using [hormonal] birth control, I knew something had changed in me. I didn't feel like myself. I was tense and irritable. It was so bad that I decided to switch to another [contraceptive] method. After that, things returned to normal. That's how I knew it was my birth control. But how do I know when I'm exposed to [environmental] chemicals? How do I know when they are exerting their influence on me and my emotions?

It is impossible to distinguish the effects of chemical endocrine disruptors from that of endogenous hormones, intentionally administered hormonally active substances such as contraceptive hormones, or naturally occurring phytohormones (plant hormones) absorbed from our diet. Nor can said effects be isolated from those of many other non-hormonal influences, both biochemical and social, which also inscribe themselves on our emotions. The extent to which ubiquitous chemical endocrine disruptors permeate human bodies and interfere with the functioning of our endocrine systems remains uncertain, and consequently it is not possible to determine the precise scope of their co-responsibility for our emotions. Given their ubiquity, it is likely that they impact our emotions, but just how extensive this influence is and whether it is implicitly harmful, giving rise to emotions that we consider "negative," "unpleasant" or "unhappy," cannot be conclusively determined. This uncertainty does not stem from a lack of knowledge of the causal link between endocrine disruptors and disturbed emotions, but from an inherent indeterminacy that contests the very possibility of establishing the relationship between correlation and causation.

Feminist theorist Karen Barad places indeterminacy within the context of a complexity characterized by a multiplicity of interacting components, non-linear dynamics and the spontaneous emergence of the new, where interrelated phenomena "intra-act" in ways

34 International Association for Premenstrual Disorders, *Premenstrual Symptom Tracker*, 2021, <https://iapmd.org/symptom-trackeriapmd.org/symptom-tracker> (accessed 3 March 2023).

35 It leaves out the eleventh symptom – the only physical symptom of the list. I omitted the physical symptom in order to focus attention on the emotional and psychological aspects of endocrine disruption and to make the tool gender inclusive.

36 Conference paper presentation "Getting Angry With Environmental Chemicals," *Earth Sensations: Affects, Sensibilities and Attachments in an Era of Climate Change*, Aarhus Institute of Advanced Studies, Aarhus University, Denmark, 13–14 October 2022, <https://aias.au.dk/events/earth-sensations> (accessed 3 June 2023).

that contradict the straightforward linearity of cause-effect relationships.³⁷ The mutual co-constitution of interrelated material and social phenomena born out of the possibilities of a given situation, as Barad considers them, prompts us to be cautious in our judgments about the impacts of endocrine disruptors. Their effects cannot be precisely predicted in advance, but instead unfold in concrete, situated processes of performative becoming. What makes endocrine disruptors toxic may not ultimately be solely their biochemical properties, but also their origin in unscrupulous, profit-driven industrial production and the involuntary nature of our exposure to them. By focusing on the diverse – and not necessarily always harmful – effects of exposure to endocrine disruptors in our lives, such as their effects on our emotions, rather than reducing them to the looming threat of infertility and cancer, we can achieve a richer and more politically generative understanding of our collective becoming with global networks of industrial chemicals.

Drawing on Barad's insights, the EDTT challenges individual understandings of our exposure to chemicals and individual responsibility for sufferance of their effects. Unlike the medical manuals and self-monitoring health apps to which it refers in its design, the EDTT does not provide an individual diagnosis or prognosis, nor does it offer a solution in the form of an individualized preventive or therapeutic intervention. Instead, the EDTT is a tool for the collective practice of collaborative workshops that highlight the need to systemically address the problem of environmental chemical disruptors and involuntary exposure to them. The EDTT is designed to facilitate discussions about how our bodies and needs are evolving in an era marked by chronic chemical exposure. What do industrial chemicals bring into our lives? How do we deal with their continual presence?

The EDTT workshops consisted of two four-hour sessions held two weeks apart. During the period between the two sessions, participants recorded observations regarding their own emotions and those of the people they came into contact with, as well as the impact of these emotions on their lives, using an emotional symptom tracking chart. During our group discussions, we then explored the possible impact of chemical pollution on our emotions, not as an independent phenomenon, but as part of a complex web of intertwined biochemical and social relationships. In line with this premise, workshop participants acknowledged that they could not always identify the exact cause of their emotional discomfort. For example, environmental chemistry student Eliška, who struggled with severe forms of anxiety and depression, said the following:

In my case it's usually the accumulation of a whole load of little things. But I'm not able to pinpoint the root cause. So when I was clinically depressed, I didn't know why. I guess there was a cause, but I couldn't put my finger on it. But at the same time, I wasn't able to turn the emotion off. I was incredibly unhappy and I didn't know why, and it was only medication that helped.

Pavel, a recent graduate of physical education and sports, who now works as a sports instructor for children, said the following:

37 Karen BARAD, *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*, Durham: Duke University Press 2007.

I can't always figure out what the cause is, and I also reckon it's a host of little things that mount up and get to you. But I can't always pinpoint what the trigger is or if it has a main cause or common denominator.

A recurring theme that emerged during the workshops was the opportunity to openly speak with others about the participants' "unhappy" or "negative" feelings, such as loneliness, anxiety, sadness, grumpiness or irritability. Not only the absorption and secretion of chemicals involved in the regulation of our emotions, but also the subsequent ebb and flow of these emotions became a pillar of our discussion regarding the Endocene ecology of emotions. Interestingly, the participants noted that while they typically kept their emotions to themselves so as not to "bother" others, they did not mind if others shared their emotions with them and did not feel "bothered" by them. Here's Ondra, a student of international relations and European politics:

If I were to think of "negative" emotions, such as sadness or anger, then I'd have to say that I experience them. But I try not to pass it on to others. I don't want to burden others with my feelings. At the same time, I don't mind taking on the emotions of the people around me.

In addition to the original goal of the workshops, namely, to trace the disruption of our emotions and subjectivity wrought by the Anthropocene, a parallel ambition crystallized, which, on the contrary, involved the de-individualization of our subjectivity and emotions, which in the era of the Endocene do not arise autochthonously, but also from the world transformed by industrial capitalist modernity. The workshop concluded with a speculative session in which we collectively imagined what would change if we knew that chemical exposure does indeed significantly disrupt our emotions. The participants suggested that such a hypothetical scenario could prompt profound shifts both in their personal lives and in society at large. Interestingly, the social (un)acceptability of emotions, reflected in the (in)ability to discuss intimately experienced "unhappy" or "negative" feelings openly in public, was again a concern. Here's Eliška:

I probably wouldn't have a problem talking about it like that because I would know it wasn't my fault. I mean, it's not my fault anyway. But when, for instance, I meet someone new, I don't start telling them my problems, because I feel like I'm bothering them or they're not interested.

Ondra concurred:

I guess I share the opinion that has already been expressed here that it would be better if we found a way of speaking openly of these matters. I'm sure it would be part of a big social debate. It would be something that would be talked about normally because it just happens. You'd be able to say to yourself: "Look, it affects everyone so we can talk about it because everyone knows what's involved." There would probably be a social movement... to address it on the one hand and to acquire or maintain an awareness of it... I don't know what

I'd compare it to because it's not really open to comparison... But it would resonate in society in general in some way if it was made clear that it was the influence of something from outside, and not just the business of each individual.

In response, Eliška added:

I believe the individualized approach is very much determined by society. Because my problems are not openly talked about, I don't talk about them either. But if it were considered normal to talk about these things... If it were completely normal, I'd experience my emotions differently too.

The speculative approach has proven to be an effective way of addressing the issue of endocrine disrupting chemicals whose harmful effects, though real, remain uncertain. If "what we have seen so far is only the tip of the iceberg," as the World Health Organization and the UN Environment Program report on chemical endocrine disruptors states,³⁸ then the speculative approach may be a suitable response to the problem of Endocrine disruption that will help draw people's attention to the urgent need for systemic preventative measures. The workshops further validated my belief that the transformation of ourselves, reflected in our changing subjectivity and feelings such as despondency, loneliness, irritability and an increasingly limited capacity to cope with the painfully experienced manifestations of our own bodies, can serve as a productive starting point for thinking about the world reshaped by human activity. They also highlighted the need to situate these emotions within a broader framework of a complex ecology of emotions, which includes the absorption and excretion of biochemically active molecules, as well as the overflow and spillover of emotions in human and non-human exchanges and relationships.

The Anthropocene as (an)esthetic

By developing the concept of the Endocene, I aim, among other things, to contribute to a particular strand of critical scholarship, which contends that the Anthropocene marks not only the disruption of planetary climates and ecosystems, but also a profound disruption of our ability to perceive and comprehend the world around us. Crucial in this regard is the argument put forward by cultural theorists Heather Davis and Etienne Turpin, who, in their introduction to *Art in the Anthropocene*, suggest that the Anthropocene is primarily an esthetic phenomenon – in the sense of the original Greek meaning of αἰσθητικός [aisthetikos], which refers to the capacity for sensory perception.³⁹ According to Davis and Turpin, the Anthropocene as a "sensory phenomenon" or "esthetic event" overwhelms our sensory and perceptual apparatus with projections of environmental collapse, thereby impairing our ability to experience and understand the world in which we live:

38 BERGMAN, *State of the Science of Endocrine Disrupting Chemicals 2012*, p. 18.

39 Heather DAVIS – Etienne TURPIN, "Art & Death: Lives Between the Fifth Assessment & the Sixth Extinction," in: Heather DAVIS – Etienne TURPIN (eds.), *Art in the Anthropocene: Encounters Among Aesthetics, Politics, Environments and Epistemologies*, London: Open Humanities Press 2015, pp. 3–15.

The Anthropocene can be framed as the global condition of being born into a world that no longer exists. [...] We are all “being overtaken by processes that are unmaking the world that any of us ever knew,” Deborah Bird Rose asserts. This overtaking is primarily an esthetic event. Our sensorial and perceptive systems are being refashioned at rates that we can barely keep up with, as the world around us changes so rapidly.⁴⁰

In this context it is worth recalling the reflections of the philosopher and theorist of postmodernism Wolfgang Iser, who also explored esthetics as “aisthetikos,” referring to the concept that encompasses all forms of perception, including sensory ones.⁴¹ Along with esthetics, Iser examines its dialectical opposition “anesthetics”:

I use the term “anesthetics” in contradistinction to “esthetics.” “Anesthetics” refers to a state in which the elementary condition of the esthetic, i.e. the ability to feel, is annulled. Inasmuch as esthetics amplifies perception, anesthetics induces insensibility in the sense of the loss, disconnection or impossibility of sensibility on all levels, from physical numbness to spiritual blindness. In short, anesthetics is the flip side of esthetics.⁴²

Esthetics and anesthetics both shape acts of perception, and in conjunction (and opposition) establish the limits of the perceptible. In his book, Iser examines the impact of rapid technological developments, the new media reality and the postmodern situation, all of which result in an overwhelming amount and intensity of stimuli. This in turn creates a need to re-set these boundaries, especially at the most basic level of sensory perception. Even prior to Iser, the transformation of the sensory apparatus forced by the nature of modern experience was addressed by the philosopher and visual culture theorist Walter Benjamin, who, drawing on Freudian psychoanalysis, understood this experience neurologically, as the experience of shock.⁴³ At the same time, Benjamin’s approach was based on the Freudian assumption that consciousness, which does not retain memory traces, functions as a protective shield against excessive “energies” (external stimuli) by preventing their imprint in memory. Benjamin quotes Freud:

For a living organism, protection against stimuli is almost more important than the reception of stimuli. The protective shield is equipped with its own store of energy and must above all strive to preserve the special forms of conversion of energy operating in it against the effects of the excessive energies at work in the external world – effects that tend toward an equalization of potential and hence toward destruction.⁴⁴

40 DAVIS – TURPIN, “Art & Death,” p. 11.

41 Wolfgang ISER, *Estetické myslenie* [Slovak edition], Bratislava: Archa 1993.

42 ISER, *Estetické myslenie*, p. 10.

43 Walter BENJAMIN, “On Some Motifs in Baudelaire,” in: Howard EILAND – Michael W. JENNINGS (eds.), *Walter Benjamin: Selected Writings 4: 1938–1940*, Cambridge MA: Harvard University Press 2003, pp. 313–355.

44 Sigmund FREUD (*Beyond the Pleasure Principle*, 1921) quoted in: BENJAMIN, “On Some Motifs in Baudelaire,” p. 317.

The danger that these “energies” pose is the threat of shock. According to Benjamin, shocks are not occasional bursts of tension in the new industrial modernity, but rather an everyday occurrence. However, the anesthetic function of consciousness, which dampens the shocks of the techno-world by preventing them from penetrating deeply enough to leave a lasting trace in the memory and cause trauma, is double-edged. Without depth of memory, experience is impoverished and the numbing of pain, much like anesthesia during surgery, comes at the expense of memory loss and diminishes our ability to perceive and respond even to stimuli crucial for survival. Although neither Benjamin nor Welsch linked changes in the sensory apparatus to living in capitalist (post)modernity within the context of environmental disruption, their ideas can be reinterpreted in light of T. J. Demos’s insight regarding the interconnectedness of ecosystems with techno-ecologies, including image and media ecologies, for the purpose of the debate on the Anthropocene.

Within the context of my research on the biochemical activity of industrial chemicals which alter the functioning of our bodily functions at the cellular level, affecting the development and activity of the nervous system and brain, the argument regarding the esthetic-anesthetic impact of the Anthropocene achieves greater salience on yet another level. Interactions with synthetic chemicals modify the physiology of our perception, cognition and emotional experience, and thus – on a material, embodied level – our ability to perceive and understand the world around us. My argument extends Benjamin’s neurological perspective on the consequences of chronic exposure to stimuli. As opposed to Benjamin, however, in my research, these stimuli are not external information reaching our senses, but rather internally communicated biochemical signals mediated by endocrine disruptors. The concept of the Endocene names the consequences of this action, namely, our growing inability to fully comprehend and engage with the changing world, as we struggle to locate ourselves within the complex web of processes and relationships of an interconnected Anthropocene coexistence.

By introducing the concept of the Endocene, I aim to highlight what the polished images of the Anthropocene destruction often conceal. While spectacular panoramas of human-transformed landscapes, awe-inspiring satellite imagery, or authoritative visualizations of satellite data allow us to witness the catastrophe of the Anthropocene from a comfortable distance, the notion of the Endocene emphasizes that catastrophic changes are happening so close to us – within us – that stepping back to fully grasp the scale and scope of this transformation becomes impossible. On the one hand, the permeation of industrial chemicals through our bodies and the changes they induce, including the manipulation of our sensoria, prevent us from fully seeing how much the world (and we along with it) is transforming. On the other hand, the changing sensitivity and receptivity of our bodies might hold the key to understanding these processes and changes. Building on my interpretation of the thesis that the Anthropocene is an esthetic – sensory – phenomenon reflecting the changing conditions of life on Earth, we can trace the Anthropocene through the inadequacies of our perception, which fails to convey accurate information about the world and instead presents us with a distorted and distorting view.

Emotions of the Endocene

The Anthropocene is undoubtedly a concept that stirs emotions, not only in heated debates about climate disruption, the role of human activities and the appropriate responses, but also literally, as Anthropocene transformation leads to psychological changes. According to a groundbreaking study by the American Psychological Association, the

majority of respondents surveyed believe that the climate crisis is the greatest challenge facing society today.⁴⁵ More than two thirds reported experiencing anxiety and perceived a negative impact on their mental health. The youngest group of respondents, aged 18–34, were the most affected, with almost half saying that climate-related stress is impacting their daily lives. In Europe, a group of Hungarian researchers is conducting an extensive questionnaire and qualitative study with thousands of participants to provide a more nuanced understanding of negatively experienced emotions – from anxiety to grief and guilt – associated with the global climate crisis and ecosystem disruption.⁴⁶ Environmental researcher Panu Pihkala has conducted an extensive review of existing studies on eco-emotions, proposing a “taxonomy” of these emotions.⁴⁷ Anthropological research has also delved into the topic of environmental emotions. Ashlee Cunsolo and Neville R. Ellis have conducted groundbreaking studies over the past two decades, focused on an Inuit tribe in the Arctic Archipelago and a farming community in Western Australia, both of which have been forced to make significant life changes due to climate change.⁴⁸

Glenn A. Albrecht, a theorist of Anthropocene emotions, situates his research within specific contexts of communities struggling with drought or the effects of mining in New South Wales, Australia.⁴⁹ Based on his observations, Albrecht proposes a new term – “solastalgia” – to describe the emotional and existential distress caused by environmental change. The neologism solastalgia combines the Latin *sōlācium* (solace, comfort, relief) and the Greek *algie* (pain, suffering, grief) to express the anguish resulting from the loss of a familiar environment – the homesickness that overwhelms us even while still being at home:

The factors that cause solastalgia can be both natural and artificial. Drought, fire and flood can cause solastalgia, as can war, terrorism, land clearing, mining, rapid institutional change and the gentrification of older parts of cities. I claim that the concept has universal relevance in any context where there is the direct experience of transformation or destruction of the physical environment (home)

- 45 Sophie BETHUNE, “Majority of US Adults Believe Climate Change Is Most Important Issue Today,” *American Psychological Association*, 6 February 2020, <https://www.apa.org/news/press/releases/2020/02/climate-change> (accessed 13 October 2023).
- 46 Csilla ÁGOSTON – Róbert URBÁN – Bence NAGY – Benedek CSABA – Zoltán KŐVÁRY – Kristóf KOVÁCS – Attila VARGA – Andrea DÜLL – Ferenc MÓNUS – Carrie A. SHAW – Zsolt DEMETROVICS, “The Psychological Consequences of the Ecological Crisis: Three New Questionnaires to Assess Eco-Anxiety, Eco-Guilt, and Ecological Grief,” *Climate Risk Management*, Vol. 37, June 2022, <https://doi.org/10.1016/j.crm.2022.100441> (accessed 13 October 2023).
- 47 Panu PIKHALA, “Toward a Taxonomy of Climate Emotions,” *Frontiers in Climate*, Vol. 3, January 2022, pp. 1–22.
- 48 Ashlee CUNSOLO – Neville R. ELLIS, “Ecological Grief as a Mental Health Response to Climate Change-Related Loss,” *Nature Climate Change*, Vol. 8, April 2018, pp. 275–281.
- 49 Glenn ALBRECHT, “‘Solastalgia’: A New Concept in Health and Identity,” *PAN – Philosophy, Activism, Nature*, Vol. 3, 2005, pp. 44–59; Glenn A. ALBRECHT – Gina-Maree SARTORE – Linda CONNOR – Nick HIGGINBOTHAM – Sonia FREEMAN – Brian KELLY – Helen STAIN – Anne TONNA – Georgia POLLARD, “Solastalgia: The Distress Caused by Environmental Change,” *Australasian Psychiatry*, Vol. 15, 2007, No. 1, pp. S95–S98; Glenn A. ALBRECHT, *Earth Emotions: New Words for a New World*, Ithaca – London: Cornell University Press 2019. Much research has drawn on the term introduced by Albrecht, most notably the anthology Paul BOGARD (ed.), *Solastalgia: An Anthology of Emotion in a Disappearing World*, Charlottesville – London: University of Virginia Press 2023.

by forces that undermine a personal and community sense of identity and control. Loss of place leads to loss of sense of place experienced as the condition of solastalgia.⁵⁰

One notable finding of the studies conducted so far is that the intensity of these feelings is not necessarily greater among individuals and groups in rural areas compared to those in urban settings. Concepts such as climate anxiety, environmental grief or Albrecht's solastalgia resonate not only with rural communities, whose social and cultural life, tied to the local landscape, is directly affected by environmental change, but also with young urban dwellers, whose lives are less directly affected by climate and ecosystemic shifts, and whose main habitat are the digital landscapes of social media.

The emotions of this group are likely to reflect not only the tangible manifestations of climate change and ecosystem balance, but also the evolving media ecology. This dynamic is played out in the film *Poznámky z Eremocénu* (Notes from Eremocene), directed by Viera Čákanyová, where feelings of loneliness and sadness over the loss of natural diversity and interspecies bonds are linked with feelings of sorrow, isolation and alienation experienced in digital landscapes populated by algorithmic entities.⁵¹

The concept of the Endocene provides a framework for expanding the register of Anthropocene-related emotions, suggesting that these feelings are not solely responses to climate and ecosystem change, but may also be rooted in the biochemical rearrangement within our bodies caused by chronic exposure to anthropogenic chemicals. Disruptions in biochemical balance may contribute to feelings of sadness, despondency, existential distress, hopelessness, futility and loneliness, which may or may not be subsequently associated with perceived ecological losses. The biochemical subversion of emotional wellbeing and psychological resilience adds another layer to the complex emotional landscape of the Anthropocene, where the erosion of natural environments parallels the dissolution of the self, further fragmented by the corrosive effects of digitalism and machine-generated content.

From emotion to action

Albrecht, along with many other researchers studying psychological changes in the wake of the climate crisis, openly acknowledge that their goal is not only to accurately identify and describe the emerging emotions, but also to harness them in support for progressive environmental policies and necessary systemic changes. With similar goals in mind, I organized several workshops in the fall of 2022, which, in addition to exploring the possible connection between chemical exposure and emotions, focused on their potential to mobilize politically effective affective responses to the extractive practices of the chemical industry, which systematically harms life in all its forms.⁵² My approach drew on the work of feminist thinker Sara Ahmed, who studies emotions as cultural practices rather than merely as visceral, psychological phenomena, and brings attention to their social and

50 ALBRECHT, *Earth Emotions*, p. 39.

51 Viera ČÁKANYOVÁ, *Poznámky z Eremocénu*, 2023, film, 78 min., <https://www.berlinale.de/en/2023/programme/202301075.html> (accessed 11 November 2023).

52 For more see VESELÁ, *Syntetická těla*, and VESELÁ, "Getting Angry with Endocrine Disrupting Chemicals."

political value.⁵³ Ahmed reflects upon how emotions are experienced and expressed within socio-cultural interactions, and explores the political impact of public displays of these emotions, in particular anger. In doing so she builds on the assertion made by philosopher, feminist and civil rights activist Audre Lorde, that “anger expressed and translated into action in the service of our vision and our future is a liberating and strengthening act of clarification.”⁵⁴ For both Lorde and Ahmed, emotions like anger and hate not only inform us of present and past injustices, but also constitute a source of energy that can propel us toward new futures. Drawing on Lorde, Ahmed emphasizes the transformative potential of anger, which, when expressed publicly rather than suppressed and tamed, can help us envision and enact new worlds:

If anger energizes feminist subjects, it also requires those subjects to “read” and “move” from anger into a different bodily world. If anger pricks our skin, if it makes us shudder, sweat and tremble, then it might just shudder us into new ways of being; it might just enable us to inhabit a different kind of skin, even if that skin remains marked or scarred by that which we are against.⁵⁵

Following Ahmed and Lorde, during the workshops I sought to explore the potentials of emotional practice harnessing emotions whose origin, nature and intensity are affected by chemical endocrine disruptors. However, the assumption that collectively shared gloom, anxiety, frustration and irritability can form the basis for mutual support and solidarity-based political action was challenged during the collaborative workshop experience. Participants described how they withdraw into isolation when sadness, anxiety or feelings of confusion weigh upon them. Many said that they often had no choice but to wait for these feelings to subside. Eliška confided to the group that while sometimes these states may have lasted only a few hours, at other times they persisted for weeks, forcing her to resort to psycho-pharmaceuticals for relief. The emotional and psychological states shared by workshop participants and the way they were experienced did not therefore offer a straightforward opportunity for their affirmation and mobilization. Not only were feelings such as anxiety, depression, psychological exhaustion, emptiness, confusion and meaninglessness not shown to be an energy that could be transformed into collective solidarity-based action, but, on the contrary, were exposed as fundamental obstacles that paralyze, exclude and prevent participation in social and political life. The possibility that these emotions, which cause us pain and hurt, could also become a source of strength, was undermined during the course of our collective debates and was largely contingent on rethinking how we perceive these emotions – their de-individualization and re-situation within a broader, more-than-human collectivity or Anthropocenic cohabitation.

The fact that Anthropocene-related emotions may lack transformative potential is at odds with the broader promise of the Anthropocene as a concept arousing passion that many see as a way to draw attention to the urgency of the current crisis. However, the critique of apocalyptic imagination dramatizing the inevitability of Anthropocenic doom is also problematic in this context. Critics of the apocalyptic depictions point to

53 Sara AHMED, *The Cultural Politics of Emotion*, Edinburgh: Edinburgh University Press 2004.

54 Audre LORDE (*Sister Outsider: Essays and Speeches*, 1984) quoted in AHMED, *The Cultural Politics of Emotion*, p. 175.

55 AHMED, *The Cultural Politics of Emotion*, p. 175.

the ineffectiveness, even counter-productivity, of catastrophizing visions, which they argue depoliticize the situation of planetary climate disruption and become an excuse for inaction. Nihilism and negativity, argues the philosopher and theorist of posthumanism Rosi Braidotti, one of the strongest opponents of resigned defeatism, thus make effective resistance to the pernicious extractivist practices of late capitalism impossible. Braidotti rejects negativity, understood as the inability to affirm planetary conditions, in the following passage:

That's exactly how the negative functions. It's toxic, toxic for the earth, the social, psychic and environmental. It's not just killing. It's a slow death. To get that out of a system is clinical as well as critical. So, we should make the clinical exercise of the detox from negativity our number one priority to live a life of the mind that constructs affirmation. It's not about optimism and feeling good. Who cares about how you feel?⁵⁶

In the light of my research, I can only partially endorse such a harsh critique of negativity. The anxiety of apocalypse and extinction appears to be real, severe and difficult to overcome, as does the paralysis that arises because of this anxiety and hinders the cultivation of solidarity and commonality in the search for and promotion of systemic solutions. And while I believe that the emotions reflecting the distressing conditions of life in the Anthropocene are an important source of embodied knowledge about the world today, and thus hold out a certain critical (and political) potential, I recognize that valorizing these traumatic, painful experiences has its limits. It is not always possible to turn a bad experience into a good one. A proactive approach, positive thinking and creative solutions do not always help, and it is not always possible to reassemble and reorganize in a desirable way, whether that involves molecules or the capitalist system.

56 Heather DAVIS – Rosi BRAIDOTTI, “The Amoderns: Thinking with Zoe,” *Amodern*, July 2016, <https://amodern.net/article/amoderns-thinking-zoe/> (accessed 2 February 2023).