The Aesthetic Fusion of Biology and Art in Redefining Human Evolution from Fossils to the Future

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Abstract. An exploration of post-human evolution and the complex intersection of technology, ethics, and art has been envisioned for a future shaped by transformative technological advances. The current phase of research examines post-human evolution bio-art and transhumanism, focussing on aesthetics, interests, and ethical dilemmas. This thesis, exploring questions about the origins of human life, explores new evolutionary trajectories through creative practices, illuminating the potential of genetic engineering and technological interventions to redefine human form and capabilities. Reflecting human evolution and the potential for non-carbon-based life, this exploration of the origins of life highlights the role of silicon, advances in genetic engineering, and contemplates human adaptations through genetic engineering and technological interventions, ultimately combining artistic experimentation and material exploration to envision potential future life forms. Ethical dilemmas regarding gene editing and biotechnological interventions emerge in the relationship between technology and human evolution, emphasizing the importance of ethical frameworks and bio-art in shaping post-human evolution. The art project explores the boundaries of human evolution and bio-art, promoting connections and reflections on bodily limits, originary complexity and ethical issues.

Keywords: Evolution, Silicon-based life, Gene editing, Bio-art, Post-humanity.

1 Introduction

Advances in gene-editing technology have led to a consideration of the potential evolution of a post-human state. These advances raise questions about the ethical, social and existential implications of altering human biology, potentially leading to the emergence of new forms of life and consciousness.

My fascination with the theory of extraterrestrial creation has fuelled a project that envisages a future evolution shaped by the genetic processes of advanced literature, utilising animal skeletons and ceramic beads as the primary medium for combining human and animal skeletons to construct new forms of life. The aim is to stimulate thinking about the future progress of life, an interdisciplinary approach that promotes deeper connections and understanding through artistic expression and physical interaction.

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My research revolves around the origins of life and the potential of non-carbon based life forms, as well as the discussion of the impact of genetic engineering on human evolution and the advancement of consciousness. It explores these themes from scientific, philosophical and discursive narratives. Research methods include literature reviews, document analyses, and artwork.In his review of some of the academic history of post-human evolution, Stefan Lorenz Sorgner is a prominent figure in the field of post-human philosophy and the art of creativity. In his article "Elements of a Posthuman Philosophy of Art", he discusses the influence of posthuman philosophy on artistic expression, with a particular emphasis on biological art. It also questions the relevance of art in naturalistic and evolutionary terms, challenging traditional aesthetic concepts and attitudes, and highlights the ways in which posthuman artworks can challenge the traditional two-dimensionality, offering alternative proposals and innovative sensory experiences. This art form combines critical post-Mythic and transhumanist reflections, bringing new artistic paradigms and challenges (Sorgner, 2020).[1] In the article "Human Evolution in the Hands of Transhumanists" it is shown that a better life can be achieved through enhancements such as the elimination of disease and incompatibility (Zorica, 2021).[2] In the article 'Why Should We Become Posthuman? The Beneficence Argument Questioned', a discussion showing the disconnect between current human values and potential posthuman values emphasises the need for a deeper understanding of how these values have evolve and diverge, underscoring the need for deeper understanding and the need for ethical reflection and dialogue in shaping the future of human enhancement (Vaccari, 2019).[3] Furthermore, the emerging field of bioart challenges traditional notions of art and biology by combining scientific knowledge with artistic expression, with bioart experiments and genetic engineering opening up new avenues for artistic expression. Artists use biological materials and genetic information to create innovative works that blur the boundaries between art and science. Challenging conventional notions of what it means to be human. Among the issues addressed in their research are the impact of posthuman philosophies on artistic expression, the potential benefits of transhumanism in improving human life, and the ethical dilemmas posed by the divergence between current human values and potential posthuman values. My research questions stem from my background in art and design and my exploration of the origins of life. Delving into human evolution, I question the future of our species and the possibility of alien involvement in our creation. Inspired by documentaries and scientific hypotheses, I investigate the possibility of non-carbon based life forms, particularly silicon-based life. Through my creative practice, I aim to explore the boundaries of the potential evolution of the human body and biological art.

2 The Origin of Life

2.1 Human Origins and Evolution

This project, entitled "Evolution", grew out of a search through the Museum of Natural History, looking at traces of ancient fossils and extinct forms of life, which led to a reflection on the future of the species' existence. It raises questions about potential

divergences in the trajectory of human evolution and questions the persistence of our current physiological traits.

The human origins hypothesis encompasses a wide range of beliefs and theories, reflecting the complexity of our understanding of how Homo sapiens came to be. The evolutionary hypothesis suggests that over millions of years of natural selection, humans evolved from early primitive humans. This process is illustrated in documentaries such as "The Evolution of Man: Our Story".[4] The simulation hypothesis proposes that human reality may be a simulated structure [5], similar to the world created by computers. This concept raises profound questions about the nature of existence. Furthermore, intelligent design, often associated with biblical creationism, extends to concepts such as genetic manipulation by ancient aliens. Evolutionary creationism reconciles religious beliefs with the theory of evolution, arguing that God guided the evolution of mankind.[6] These perspectives challenge the twofold division between science and religion and provide a nuanced understanding of human origins. The interplay between scientific, religious, and philosophical perspectives has prompted people to continue exploring and discussing the place of human beings in the universe.

The evolution of human beings over a period of 2-3 million years has always been a topic of interest and debate among researchers. The extensive chemical record, genetic studies and comparative anatomy support the understanding that humans have evolved gradually over millions of years, which contradicts the theory of evolution, which suggests that major biological changes have taken place over a period of only 2-3 million years. Increasingly, there is a tendency to hypothesise that human beings may be the product of genetic processes resulting from advanced extraterrestrial or more advanced forms of life. This view has gained traction. This tendency has been heavily influenced by The Roswell Interview [7], a documentary film of conversations detailing the encounter with an alien entity called Airo during the Roswell incident in 1947, whose body composition breaks with traditional categorisations, and which is described as a sentient entity, rather than a mechanised structure or organic form of life. At the centre of these revelations are first-hand testimonies and descriptions of transcendent natural entities that shed light on the mysterious events surrounding the Roswell UFO crash. Additionally, Hai-Orien's The Precure [8] is a groundbreaking science fiction narrative novel that delves into the origins of mankind and the mysteries of the universe, offering unconventional perspectives from the author's own experience. In addition, "The Lacerta File" documents an encounter between a self-proclaimed reptilian entity and a human subject, questioning the traditional timeline of human evolution millions of years ago.[9] Through my knowledge of these novels as well as film documentaries, I have also become interested in the origins and evolution of mankind.

2.2 Scenarios for Non-carbon-based Life

Carbon-based life is dominant on Earth and has been extensively studied in biology. However, as human exploration of the universe continues to expand, there is growing interest in whether life exists beyond carbon-based forms.

The concept of silicon-based life has long been a topic of discussion in the scientific community, as it was first proposed by Julius Sheiner in 1891, followed by Asimov's book Not As We Know It: On the Chemical Forms of Life,[10] which explored the concept of life forms and challenged traditional assumptions about the chemical basis of life. This hypothesis suggests that there are life forms whose basic composition is centered on silicon rather than carbon. He has proposed several speculative non-carbon-based life forms, including silicon-based organisms, sulfur-based fluorocarbons, nucleic acid/protein organisms dependent on liquid water or liquid ammonia, and lipids dependent on liquid methane or liquid hydrogen. These life forms may be beyond our current understanding, but they prompt us to consider the possibility of non-carbon-based life elsewhere.

A wide variety of research articles provide interesting perspectives in order to understand non-carbon-based life. Author Elio Quiroga delves into the chemistry of silicon and its potential as a gene carrier, revealing how extreme temperatures can favour silicon-based reactions, reshaping our understanding of habitable environments.[11] Similarly, the article On the Potential of Silicon as a Building Block for Life, an assessment of silicon-based biochemistry provides valuable insights for researchers, outlining the limitations and possibilities of silicon in different solvents and guiding future biochemical exploration.[12] Meanwhile, author Tim J Dumonceaux challenges the conventional view by proposing a high degree of co-operation between extraterrestrial life forms, providing a new perspective on ecosystem dynamics.[13] Finally, the article Upper limit on the fraction of alien civilizations that develop communication technology, reassesses the potential for silicon-based organisms to thrive outside habitable zones, expanding our understanding of potential habitats and cosmic biochemical diversity, complexity of the universe.[14] Taken together, these studies provoke thinking about the vast possibilities for life forms beyond our current understanding.

2.3 The Possibility of Silicon-based Life

The appeal of silicon-based life stems from its similarity to carbon, spurring interest in exploring life beyond traditional norms. Silicon-based life, which currently exists only in science fiction, is generally portrayed as a higher level of intelligent life than humans. Research by Frances Arnold, a chemist at the California Institute of Technology, and her team reveals silicon's potential as a building block for life. Through directed evolution, they created new silicon-carbon bond cutting enzymes, demonstrating the ability to process silicon substrates.[15] The work builds on Arnold's previous research on directed evolution, where her biology-based innovations, such as forging carbon-silicon bonds, brought new chemistry to life. These findings challenge the conventional view of the limitations of silicification and reveal the diversity and potential of silicon-based life forms.[16]

The study of carbon and silicon is motivated by their common properties, including their ability to form covalent bonds with the major group 4 elements, their tetrahedral molecular geometry, and their ability to form stable compounds with other elements. In addition, group 4 elements, particularly carbon, play a key role in organic chemis-

try, enabling the formation of long-chain organic compounds essential for life processes. As we understand it, this property is crucial because it facilitates the creation of complex biomolecules that are essential for life, thus demonstrating the potential of silicon-based life forms. Silicon-based organisms are characterised by their protein subfractions having a silicon-based framework. The Technology Survey demonstrates the potential of gene editing and mutation technologies to alter the shape of human life.

From the records of the Lycetta Archives, in particular the dialogue between an Earth person and a lizard, it is possible that the human race is an extraterrestrial being genetically modified from the Earth's primate lineage through genetic engineering. As our technology advances, this speculation is becoming more and more interesting.

Indeed, we now have relatively sophisticated gene-editing technologies, particularly CRISPR/Cas9, which has shown significant potential for various applications, particularly in therapeutics. Researchers use CRISPR-Cas9 to edit genes in human embryos in order to scrutinise their specificity and accuracy. However, these efforts have led to an ethical debate in the scientific community. In addition, the development of DNA base editors, which provide precise nucleotide modifications, has revealed new avenues for genetic manipulation.[17] For example, scientists at the Salk Institute For Biological Studies in the United States recently achieved a breakthrough in the creation of human-pig chimeric embryos. This achievement demonstrates the rapid development of genetic processes.[18]

3 Elucidation of Creative Practice Ideas

3.1 A New Exploration of the Evolution of the Body

The Earth's natural Gaia system is a self-regulating ecological system that responds to environmental crises by removing harmful substances. However, human activity, especially since the age of industry, has seriously disrupted this balance, releasing 2.4 trillion tonnes of carbon dioxide into the atmosphere, and subsequently increasing global temperatures by 1.2 degrees Celsius. Projections indicate that by 2050, temperatures will have risen a further 1.5 degrees Celsius, potentially rendering large parts of the planet uninhabitable. Against the backdrop of multiple mass extinctions throughout history, a looming question arises: how will humans face the next extinction event? Explore the various hypotheses about the origin of human beings, including evolution, creationism, and extraterrestrial creationism, which imply that human beings are the result of high-level organisms that have been genetically linked to Earth's primates. This reflection on the survival of species, especially in the face of environmental challenges and technological advances, has fuelled the search for ways to create new forms of life.

In exploring the future of human life, we face a critical point. Perhaps we will have adapted our lives in a new way, but how many of our current physical features will still be there? Drawing inspiration from artists like Viktoria Modesta,[19] who has reinvented her body, transformed her mutilation into unique beauty, and turned her own body into a unique symbol of identity and expression of beauty, adds another

layer of complexity to my exploration of body development and boundaries. I questioned the necessity of the organic body for self-expression and identity. This exploration extends to the power of genetic processes and technological interventions to redefine the form and power of the body.

By exploring the realm of in silico growth and speculative evolution through genetics, I have delved into the macro- and microscale changes that have taken place in shape, skeletal structure, cellular and DNA subsections, as well as scientific and technological advances.

3.2 Inspiration for Bio-art

First of all, carbon and silicon are investigated, because the carbon and silicon that constitute our lives are the fourth main group elements in the periodic table, their chemical properties are similar, silicon-based life is relative to carbon-based life, silicon-based life can also be defined in this way: life composed of silicon skeleton biomolecules.

Researchers have long speculated about the possibility of biochemistry outside the carbon-based paradigm. Silicon is often considered a leading candidate because it is chemically similar to carbon and is abundant in the universe. Although speculative, the concept of silicon-based life has been explored in various scientific discussions and fictional narratives, offering a wide variety of ideas for potential life forms. The paper highlights the chemical diversity of silicon and its ability to form complex polymers, similar to Earth's biochemistry. However, it highlights the limitations of silicon-based life, noting that its full utilization as a scaffolding element on Earth is highly unlikely.[20] In the broader context of astrobiology and biochemistry, further research is warranted.

Technological exploration has revealed two key technologies, gene editing and gene mutation, that are capable of reshaping biological form. These technologies, which already exist and have been developed, are primarily used in medicine. The Bioart project "Pig Wings" provides important inspiration, demonstrating the transformative potential of biotechnology and artistic interventions. The "Pig Wings" project, led by Oron Catts, Ionat Zurr, and Guy Ben-Ary, blends biological art and science.[21] Their work invites viewers to rethink the boundaries between art, science and nature, challenging us to confront the complexities of contemporary biotechnology practices. The project also demonstrates the transformative potential of bioart to reshape our understanding of life, art, and the intersections between the two.

3.3 Novel Evolution in Practice

Inspired by extraterrestrial creation theory, my project envisages a new type of evolution shaped by the genetic engineering of advanced civilisations. This view suggests that advanced civilisations have played a key role in shaping evolutionary trajectories, facilitated by new genetic engineering techniques. Within this framework, the human body undergoes two transformative changes to adapt to the challenges of future environments: the creation of chimeras that blend animal and human characteristics, and

the transition from carbon-based to silicon-based life forms. In order to "prove" this concept, different artistic experiments were carried out.

Using modelling software, visual representations of animals and humans were constructed. Techniques including origami and 3D printing were used to merge skeletal experiments, such as the creation of a hybrid human and flying lizard, whose thorax would have several ribs disappearing into new shapes to accommodate the hybrid form. This phase exemplifies the potential of genetic engineering to reshape the potential of new physical forms.

This project performs material experiments on silicon to explore its potential as a building block for silicon-based life. By adapting 3D printed bones to a silicon crystal liquid environment, the crystals can grow on their own and the molecules can arrange themselves into an ordered structure similar to that of tissues in biological systems, a dynamic interaction that hints at the similarities between crystal growth and cell adhesion, providing new insights into the feasibility of silicon-based life. Thus, this process establishes the similarity between crystal growth and biological processes.

This stage integrates gene editing techniques such as CRISPR-Cas9 to precisely modify gene sequences. Artistic manipulation of genes that are expressed to form new combinations of DNA sequences. At the same time, recognising the fragility of silicon crystals, the durability, versatility and resistance to high temperatures and pressures of ceramic beads became the medium of choice for artistic expression. The beads are woven into wearable sculptures, symbolising the transition from carbon to silicon skeletons.

As shown in Figure 1, The project depicts four stages representing the systematic transition from carbon to silicon skeletons. The gradual replacement of the carbon skeleton by a ceramic bead-like 'silicon skeleton', a patchwork of animal bones, emphasises the project's thematic focus on evolutionary transitions and the potential for future life forms.

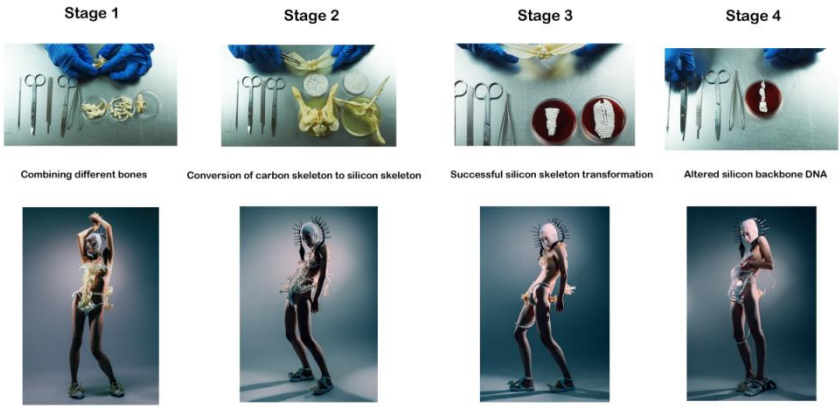

Fig. 1. The artwork "Evolution" shows the four stages of the body's gradual transformation from "carbon-based life" to "silicon-based life".

The project not only conceptualises the idea of creating new life forms through genetic technology, but also provides tangible evidence and a logical framework to support its speculative exploration of future biological advances. It also challenges the traditional boundaries between art and science, prompting reflection on the form of life and redefining the ethical responsibilities associated with humanity.

4 Insights and reflections on Post-human Evolution

4.1 The Future of Post-thinking Humanity

The concept of post-human evolution represents a shift in perspective in how we view the trajectory of the species. It stems from the intersection of technology and biology, a concept that has captured the imagination of thinkers, scientists and artists. In the emerging field of bio-art, artists like Eduardo Kac, known for his creation of green fluorescent protein rabbits,[22] have pushed the boundaries of convention by exploring genetic manipulation as a medium for artistic expression, provocations that extend beyond the art world.

As technology continues to advance, humanity is at an evolutionary inflection point that we need to consider. Many transhumanists believe in the possibility of advancing human evolution through technological advances. Transhumanism offers the potential to enhance human capabilities, extend lifespans, and eradicate disease through technological advances such as genetic engineering and brain-computer interfaces. Concerns about ethical issues, unequal access to enhancement technologies, and the risk of exacerbating social disparities require careful consideration and regulation. Against this backdrop, it is crucial to think about the future of human evolution.

4.2 Ethical Reflections on Post-human Evolution

The rapid development of technologies, including gene editing techniques such as CRISPR-Cas9, has raised ethical dilemmas regarding safety, consent, agency and the moral status of created entities, In the article CRISPR-Cas and Its Wide-Ranging Applications: From Human Genome Editing to Environmental Implications, Technical Limitations, Hazards and Bioethical Issues around the ethical considerations of genome editing, particularly in the context of modifying human embryos, highlights the need for clear ethical guidelines and regulatory frameworks to assess the risks and benefits of this technology. benefits are also really something we should consider.[23]

Art is portrayed as playing a crucial role in fostering ethical dialogue and reflection on post-human evolution. Through immersive and provocative experiences, artists confront viewers with ethical dilemmas and encourage them to critically examine their own values and assumptions. Furthermore, art has the ability to amplify marginalised voices and perspectives and advocate for a more inclusive and equitable approach to post-human evolution. Bio-art experiments and genetic engineering have been at the forefront of creating new life forms in contemporary art. Artists manipulate biological materials to create various life forms, such as semi-living organisms.[24] Such manipulations often involve genetic engineering and xenotransplantation, blur-

ring the boundaries between living organisms and artistic expression and raising human concerns. These developments emphasise the intersecting roles of technology, ethics and art in shaping post-human evolutionary discourse. While they offer unprecedented possibilities, and while technological advances like CRISPR-Cas9 offer incredible potential, the ethical implications need to be carefully considered when shaping post-human evolution.

One of the main concerns about post-human evolution is the potential to exacerbate existing social inequalities. While advances such as gene editing and augmentation technologies promise to improve lives, their unequal distribution may widen existing disparities. In Survey X: The Next 50 Years of Digital Life, this view can be seen in the responses of 530 respondents.[25] Concerns about the potential risks of gene editing and enhancement have sparked concerns about the impact on social inequality, and Jon Rueda questioned the idea that the creation of a transhuman or post-human species with a higher level of well-being than that of humans has sparked an ethical debate about human extinction and the best interests of society.[26]

Furthermore, the creation of life forms by new technologies raises questions about the moral status and rights of these entities. As sentient beings with the capacity for subjective experience, new life forms may have intrinsic moral value that warrants ethical consideration. In Zaretsky's open letter to the allegedly genetically modified human babies Lulu and Nana, he explores gene editing in the human germ line, defining it as biological art. He addresses the complexity of morality, emphasising the sensual nature of these individuals and advocating for their rights and ethical considerations. By blurring the line between science and art, Zaretsky provokes reflection on the ethical implications of creating life forms through technological intervention. His letter is a poignant reminder of the ethical responsibilities that come with advances in biotechnology, sparking a wider societal discussion about the ethical considerations surrounding the creation of new life forms, as well as the recognition of their inherent moral values and rights.[27]

4.3 Guidance for Post-human Evolution

One of the key ethical dilemmas facing post-human artists is the issue of consent and agency, intertwined with the principle of respect for living organisms. When incorporating biotechnology into their work, artists must ensure that their creative endeavours are ethical and do not violate the rights of living things. This requires a nuanced understanding of bioethics and a commitment to ethical behaviour. As mentioned in the open letter to Lulu, BEAK was established to provide artistic oversight and ethical assessment of bioart applications, emphasising the importance of consent and freedom of expression in this emerging field. This highlights the need for ethical guidelines and considerations in bioart practice to ensure that the boundaries of creative freedom are respected while maintaining ethical standards.

Respect for living organisms is central to the ethical framework of bioart experimentation. Artists must prioritise the welfare and autonomy of the organisms involved, seeking informed consent from relevant stakeholders wherever possible, including scientists, ethicists and the organisms themselves.

In addition, transparency and accountability are crucial in ethical bioart experimentation. Artists should openly communicate their methods, intentions, and potential risks to promote trust and integrity in the art community. Ethical oversight mechanisms, such as institutional review boards, play a key role in ensuring compliance with ethical standards and mitigating potential harm.

Academic institutions play a crucial role in shaping the discourse around bioethics and bioart. For example, Johns Hopkins University provides bioethics training for students through the Berman Institute's PH.700 Introduction to Fundamental Issues and Methods in Bioethics.[28] These programmes aim to provide a deeper understanding of the ethical implications of the practice of bioart and the importance of informed consent and responsible decision-making in the field.

In summary, understanding and addressing the complexities of post-human evolution is critical to our future.

5 Conclusion

My art project delves into the potential evolution of the human body and the boundaries of biological art. Promoting connection through wearability and interaction, it encourages reflection on the limits of the human body and its potential for change, whilst also prompting reflection on the complexity of the origins of life and the ethical implications of future biological advances. Looking ahead, we must rethink ethical discourse in post-human evolution. This will require interdisciplinary collaboration between ethicists, scientists, policy makers and artists to responsibly confront the complex landscape of post-human evolution. The project delves into the origins of life and provokes reflection on human evolution. Reflecting on the possibility of life beyond the traditional paradigm, it explores non-carbon-based life forms, particularly silicon-based life. Through the lens of silicon-based biochemistry and speculative discussion of extraterrestrial ecosystems research articles elucidate the role of silicon as a gene carrier and provide insights into silicon-based biochemistry, exploring uncharted territories and illuminating the potential for the diversity of life. Ethical issues are particularly salient in the context of technological advances that are propelling humanity towards critical evolutionary nodes. The rapid development of gene editing technologies such as CRISPR-Cas9 raises ethical dilemmas regarding safety, consent, and the moral status of created entities. Think about post-human evolution in this context. As humanity stands at a turning point in evolution, the project raises important questions about the ethical implications of emerging technologies such as gene editing and enhancement. Highlighting the potential for increased social inequality and the moral status of created entities, the Evolution Project highlights the importance of ethical dialogue and responsibility in our evolutionary process of shaping the future.

In the context of post-human evolution, art becomes a powerful catalyst for ethical reflection and social discourse. Through immersive experiences and provocative artworks, art projects bring audiences face-to-face with ethical dilemmas, amplify marginalised voices and advocate for a more inclusive and equitable approach to our

shared future. By blurring the lines between science, art and ethics, my project invites viewers to critically engage with the complex intersection of technology, morality and human evolution. At the heart of the ethical framework for bio-art experiments lies the necessity to respect the autonomy and well-being of living organisms. Ensuring informed consent, transparency and accountability are essential pillars guiding the practice of ethical biotechnology. Interdisciplinary collaboration becomes indispensable as we navigate the complexities of posthuman evolution.

In conclusion, endeavoring to understand the complexity of post-human evolution has far-reaching implications for the future of humanity. By fostering interdisciplinary collaboration, engaging in ethical reflection, and utilizing artistic expression, we can chart a course for the future that respects the complex nature of life and embraces responsible evolution.

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