Emerging Cultures in Art: Mapping the Shift of Creative Art Studio to an Experimental Bio Art Studio as a Science Laboratory

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Abstract

An art studio is more than just a physical place occupied by the artists to produce works of art. Throughout the history of art, the studio has undergone experimental transformations within the boundaries of its environment and art techniques. This has led to the disruption of its concept as an incubator for creativity, leading to a complete transformation from the studio environment with its materials and tools to a scientific laboratory environment. Some of it now employs living organisms artistically in places called 'bio-art studios.' This study examines the diverse experimental accumulations that the artists underwent within the art studios, shifting it to a biological laboratory.

The research employs a descriptive methodology, deriving data from publications, specialized exhibition guides, and in-person interviews posted on authorized websites of certain organizations and artists in Europe and America between 1990 and 2020.

Findings show that the shift from the studio to the laboratory was the outcome of experiments conducted inside the studios by using unusual materials and equipment. Change has been placed on the artist's workspace, including the need to follow stringent safety and preventive protocols when dealing with live organisms in the laboratory. It is concluded that a growing number of organizations and museums show more interest in setting up participatory bio art laboratories as a method of teaching and a tool for raising the cultural and social awareness. In turn, this has resulted in the increased receptivity of science to art and *vice versa*.

Keywords: Studio, Laboratory, Experimental Transformation, Interactive participation, Bio-art

Introduction

The art studios witnessed a radical change in its physical space early in the nineties of the last century, and this has prompted the artists to look to the scientific laboratory and experiment with living things as a creative element of the artistic work. Indeed, this has been assisted by scientists and technologists who have been specialized in these fields. It has led to the creation of bio art, as it was known at the time. Along with adjusting to a whole new setting and its tools and gadgets, the artist also needed to re-evaluate the production techniques, presentation strategies, and supporting cast.

In this context, this paper examines the origins and the transformation of the art studio. It aims to reveal the experimental shift from the studio to the laboratory and its reflection as a creative achievement of bio-art. Its objectives are:

1. To identify the shift resulting from the accumulations of experimentation within the art studio
2. To produce a brief historical review showing the significant factors of the changes that led to this shift.

Theoretical Framework

In-studio experimentation transformations

The Industrial development played a prominent role in disrupting the studio environment. so that it moved from its closed spatial space to the outer space, and it was the artist's responsibility while he was moving between the forests and the streets, thanks to the innovation of the ready-made color tube with various shades. This transformation generated new artistic experiences for what Known as modern art, the works that are produced by (Monet, Manet, Van Gogh) who, in their abundance and working techniques, highlighted the ease of movement with the tools and colors that were provided by the mobile studio Monet prepared a boat with the basic tools to serve as a floating studio, in which he painted landscapes and portraits of his friends (Wallace, 2014) (Fig. 1).

On the other hand, the industrial revolution affected the methods of artistic production and urged the artist to think about the utilitarian function, in addition to the aesthetic one .This was reflected in the studio environment, which now included a number of artists that are united by organized methodological unity, with differences in technique and artistic manifestation, as in Bauhaus school, it is considered the basis for the cross-fertilization of the arts and combination of the aesthetic and the functional, and the deviation of art from the authority of museum arts and the shift to the logic of circulation (Mohammed, 2015). The attempts to shift towards the outer space motivated some artists, such as Robert Smithson, to abandon even the tools and materials of art and employ elements of nature as material and conceptual alternatives, saying: Freedom from the constraints of the studio liberates the artist to some extent from the traps of the craft and the slavery of creativity (Jones,1996).

The studio is called (the factory) (Fig. 2). Founded by the artist Andy Warhol, it was an attempt to change the stereotypical studio format by rearranging the elements of the place so to suit the nature of artistic genres, such as printing, photography, film, music and multimedia, while introducing the factory techniques into the production process that provide a model that contradicts the aesthetic concepts of the original and the reproduced, with a pragmatic consumerist dimension, the collective action was not possible in America in the 1950s; right-wingers attacked it as communism, committed leftists criticized it as bourgeois, while liberals defended it as the final choice of a free individual in a democratic state (Jones,1996). The studio also became a cultural identity for the cities, it violated the expectations and rejecting the traditional frameworks of contemporary arts themes were rejected and the studio was turned into a hollow work of art (Mohammed, 2015). The artist exploited the effect of the dynamic shift that was based on dialogue and participation, so that the intersection between disciplines would serve bridging between science

and art. This concept was embodied in the spatial shift from the studio into an interactive laboratory, as in Olafur Eliasson Studio the crew of which includes 90 people in the specializations of artists, architects, designers, specialized craftsmen, art historians, scholars, and theorists. The laboratory takes an entire building that includes an archive, an art school, a seminar hall, an administration area, a rehearsal space, a production area, a workshop, and Eliasson's personal space (Coles, 2012).

In 2001, the artist Francis Bacon's studio was moved from its original location to the museum as a piece of art with all the precise details of the place, (Al -Bayati, 2023) assures that "Contemporary beauty does not look at art as a physical form in appearance or as abstract as much as it contains a problem with the effect, artist, and its recipient". Despite the fact that Bacon employed the oil painting technique in most of his works, the spatial environment he left is considered an intellectual legacy of alienation, absurdity, and indifference, In 1998, the contents of

Fig. 1: Claude Monet Painting in his Studio, Claude Monet, 1874

Fig. 2: The Factory Andy Warhol's New York City Studio

Bacon's studio were donated to the Dublin City Gallery, where a group of archaeologists cataloged and photographed every component of the chaos and archived all the contents, which included more than 7,500 diverse pieces of art (Harrison, 2006). Bacon studio was turned into an experimental laboratory for psychologists to study some pathological conditions, as it was indicated by Lacy Vitko-the treatment coordinator at the Epilepsy and Fine Art Therapy Foundation stating that, Art therapy is the process of creating works of art framed by their therapeutic relationships. The treatment takes place within the studio in several fields. Art, such as drawing, music, and acting, is the most effective treatment method, as it reduces the risk of side effects of drugs (Lowenberg, 2014). The nature of the place is considered a living documentary material. The studio, in its physical space, was turned into an artistic material after he was its producer. In an interview, Bacon said, "I can only draw here in my studio... I cannot work in very tidy places. It is easier for me to draw in a place like this is chaotic. I don't know why but it helps me" (Buchanan, 2011), (Fig. 3). The technical change in the use of materials and tools within the studio led to acceptance of the process of transformation towards new work environments.

Fig. 3: Francis Bacon's 7 Reece Mews studio, London, by Perry Ogden, 1998

The Shift from the Studio to the Laboratory

The contemporary technical shift produced new interactive relationships that terminated the barriers of classification between the artistic genres and neighboring sciences. It urged the artist to shift to work in some environments that are more suitable for artistic production processes that are not available in the traditional studio, in terms of tools, media, and working methods. The studio undergone shifts towards the forms that are more open in their absorption of multiple disciplines, often making them indistinguishable from the laboratory environment (Coles, 2012). (Fig. 4). The institutional awareness contributed to the process of shift towards a laboratory environment and that was done by employing certain educational tools towards accepting art in science, and science in art, on one hand .On the other hand, it provided the specialized materials and equipment that are financially expensive, as it was summarized by Michael Century, a program director at the Canadian Center for Information Technology Innovation when he declared that the first of such materials is the art centers that were established to support artistic experimentation with emerging technologies, for instance Experiments in Art and Technology, Institute for Research and Coordination in Acoustics and Music, Center for Advanced Visual Studies at Massachusetts Institute of Technology. Second: media centers that were interested in research and engaging the public with festivals and exhibitions. Third, is the studio laboratories that are based on strong partnerships with industry or higher education, such as Media Lab at Massachusetts Institute of Technology, Xerox Park Bayer Artist-in-Residence Program, and Center for Advanced Visual Studies at MIT. Banff (Century, 2013).

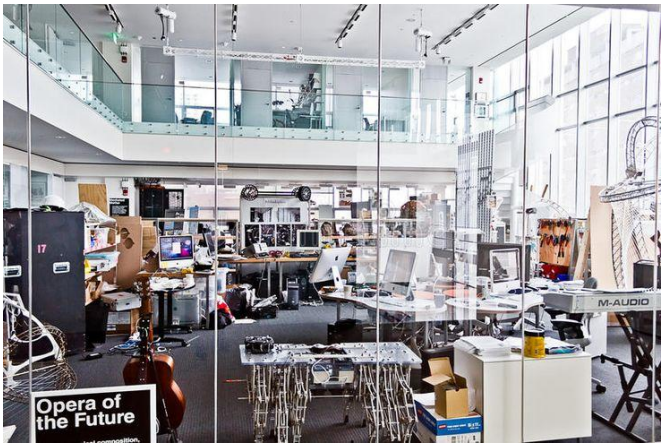

Fig. 4: Massachusetts Institute of Technology Media Laboratory (MIT Media Lab), Cambridge, USA

The intersection of experimentation between the artistic creative sense and scientific discipline produced a hybrid partnership and a multi-use environment of public benefit. It placed scientific and artistic research centers in a state of generative thinking and planning for the interactive participation in the creation of new artistic-scientific works, as it was hosted by the educational laboratory of Exploratorium Museum .It stated " We get the artists in every aspect involved in our work in multiple ways so as to inspire their curiosity, and enable them to foster an interdisciplinary approach to seeing and understanding the world. The artists contribute in countless ways to our ongoing research and development, both inside and outside the museum." (Exploratorium Arts, 2014) and thus experimentation becomes part of the show in a laboratory space that is dedicated to visitor interaction, in which pure science is transformed into the joy of discovery. Obrist and Vanderlinden, Laboratorium invited the artists and scientists to open their laboratories, philosophers and historians to explore the meaning of the laboratory, and the public to consider how the laboratory is defined. (Edwards, 2010).

The Louvre Museum provides an interactive experimental space within its unique spatial environment with Dai Nippon Printing Company- DNP Museum Lab, with modern display technologies, which aimed to make art and culture easily accessible to everyone, through developing methods and creating environments that enhance the functions of museums. traditional, covering every era in a virtual way by combining them with technological developments of multimedia displays (DNP, n.d.), as interactive laboratories that make the fun element in education as an essential factor in making science move out of its strict contexts of transferring information into a space of purposeful artistic interaction. The thinker (John Locke) believes that "man can achieve knowledge of the things that exist in the material world by deducing, that there is a basic rule upon which these connected conclusions are formed, and this rule is due to experience and sensory experience" (Abbas, 1996:62). Museums also had the laboratories that were specialized in processing and preserving the works of art in scientific ways, due to the chemical and biological reaction that was caused by the variable time and environmental factors on the materials of works of art. Hermitage Museum includes 16 specialists, including physicists, chemists, biologists, and art historians, who work in a joint laboratory environment to restore and document works of art, and detecting forgery. (Kosolapov, 2020). Diversity of laboratory collaboration between artists and scientific disciplines depends on the nature of the need. The significance of artistic collaboration is influential and effective on a level parallel to scientific interventions.

Biological Laboratory

As a result of art's evolution into a higher form of scientific artistic expression and its use of biological laboratories, its materials and tools underwent a change including the conventional tools to the ones that allowed the artist to work with living things to create art. This is known as bio art, a contemporary art form in which the artist employs living things such as bacteria, plants, and animals to express themselves artistically. He explores the nexus between art, science, and technology through the use of biotechnology, genetic engineering, and pure science in his artistic creations. In order to challenge popular perceptions of beauty, he employs evolutionary techniques (Kac, 2007). According to Gilles Deleuze, the transition from the studio to the laboratory is comparable to the expansion of the "rhizome network" since both involve non-parallel developments between heterogeneous objects and the developments that jump from one line to another rather than working through formation (Mustafa, 2018). This is the approach that research and educational institutions have taken in using the two poles -art and science- and turning them into a cultural product that uses artistic displays to further humanitarian objectives.

Oron Catts and Ionat Zurr, two artists and scholars, launched the Tissue, Culture & Art (TC&A) project in 1996. This creative partnership between science and art investigates how tissue engineering may be used to represent one's artistic vision. The Tissue, Culture & Art (TC&A) project has produced cutting-edge artworks, exhibitions, written articles, and performances that

center on the social effects of tissue engineering (Catts & Zurr, Tissue, Culture & Art project, 1996). Their projects have addressed the changing nature of human-animal relationships, laboratory-grown food, tissue-grown clothing, and life-like sculptures. The laboratory served as both a practical and theatrical setting, and their performances hinged on bringing the laboratory into the galleries with what the organism imposes. We needed to remodel the laboratory in order to alter the biomedical setting to present new emotional scenarios and contemplations) (Ionat & Catts, 2023).

Oron Catts and Ionat Zurr presented engineered tissue sculptures such as Victimless Leather, Disembodied Cuisine and Semi-living worry dolls (Fig. 5), which were displayed in an artistic context within (Ars Electronica) exhibition. The biological sculptures aroused the recipients' astonishment, who shared their fears according to the mythological structure of these dolls by recording these questions on a computer that is equipped with an application guest book (Kenway, J. et al., 2006) through which people can express their concerns to the semi-living anxiety dolls. Rituals of feeding and killing are routinely performed (Johung, J. 2019). The public is invited to witness the feeding process, which takes place in a laboratory that is located within the gallery, as an integral part of the artistic experience. At the end of each installation, we had to literally kill our creations. The killing is done by bringing out the semi-sculptures (Catts & Zurr, 2017).

Fig. 5: Disembodied Cuisine, Oron Catts & Ionat Zurr, 2003

In 2000, artists Oron Catts and Ionat Zurr collaborated with the University of Western Australia to establish the SymbioticA- which is a laboratory in an environment that combines artistic and scientific spaces. It is (the first biotechnology laboratory that was designed for spatial sharing in various disciplines between artists and scientists. Many workshops were held in various parts of the world to introduce artists and scientists to the genetic engineering of plant and animal tissues (Kelley, 2016). This laboratory contributes a lot in preparation of research knowledge and building of communication bridges with scientific disciplines at the university. Since this laboratory was opened, more than 120 residents, visual and performance artists, science fiction writers, art historians, political theorists, geographers, scientists and musicians, among well-known artists benefited and they worked with biological materials, such as Paul Vanoss, Stelark, Steve Kurtz, Paul Thomas, Orlan and Adam Zaretsky) (Star Rogers, 2022).

The significance of the shift towards the laboratory that was occupied by bio art, as an awareness tool and as part of critical intellectual influences directed towards controversial ethical, cultural, and social issues grew. Bio art can raise more controversial issues, and contribute to raising the awareness of ethical and political issues in the field of biotechnology by making science more accessible to non-specialized audiences (Thackerc, 2007) with presentation methods that allow direct audience participation. Art is not primarily about giving answers. It provokes and makes us feel uncomfortable about things so that we can re-evaluate and think about them (UWA Research

Impact, 2018). While being in the SymbioticA laboratory, artist Paul Vanouse and microbiologist Dr. Susan Barker developed the Latent Figure Protocol project, which uses DNA sequences in a gel, A DNA gel image is a culturally constructed artifact that is identified by the laboratory, looking as if it was present before laboratory intervention (Da Costa & Philip, 2008). In 2007, the SymbioticA laboratory hosted the Harlequin Coat project, that was developed by artist ORLAN who created a hybrid coat by collecting several layers of skin in addition to laboratory-made cells. It serves as a powerful symbol of cultural hybridity. The project combines digital photography and exploration of beauty from different cultures and the media. Parker-Starbuck wrote "Skin transplants are a routine procedure, practiced in our time, but what is unconventional is the transplants on my skin along with cells extracted from a black woman's fetus - sold on the Internet" (Parker-Starbuck, 2013:234).

Artist Stelarc's performances are among the artistic performances that constitute a response to the shift towards the interactive bio laboratory, through the use of spaces of medical clinics and laboratories and their tools, along with artistic works that explore the human body by applying different medical and engineering methods, as in his works (Third Hand) and (Stomach Sculpture) and (Extra Ear), which are works that are full of strangeness, excitement, and even provocation. He wrote, "Despite the initial interest shown by some doctors since 1997, they eventually changed their minds. The reason behind this hesitation is that the Extra Ear project goes beyond Mere plastic surgery and involves not only modifying existing anatomical features, which are now socially acceptable, but also delves into the realm of constructing an additional trait that might be perceived as monstrous, or resembling a birth defect, extreme body modification, or even radical genetic change" (Reichle, 2009:84). (Fig. 6) Inside the surgical theater, the laboratory products of ear engineering, surgical instruments, and the artist's body came together. Art brought the laboratory environment out of its isolation into performances that the recipient watches through a group of images during the surgical operation.

In 1997, Artist Edward Kack cooperated with a group of doctors and engineers to implant a data chip under the skin of his leg. The process of implanting the "time capsule" became an event and a direct artistic performance in front of the audience who were present in the exhibition, and it opened new dimensions in employing the technology inside a human body. A small chip was implanted in his body and broadcast live on television and the Internet (Reichle, 2009). Likewise, in his artistic work (A-positive), he transports laboratory devices to the showroom to be part of the event, and uses them directly in front of the audience .In this event, the artist and robot are in direct physical contact through an intravenous needle and transparent tubes, feeding each other in a mutually beneficial way. Eduardo Kac wrote "We can no longer consider the body to be isolated from a strong connection to the artistic scene; We cannot fail to resist biometric bio surveillance. Disembodied DNA became a computational tool, while artificial blood circulates in human blood vessels" (Kac, 2005). In 2000, artist Kac collaborated with a group of genetic engineering scientists,

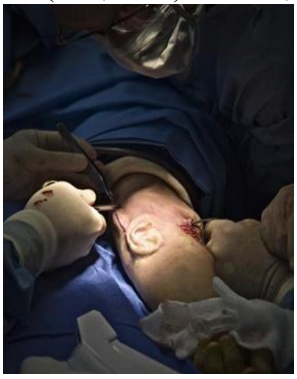

Fig. 6: Ear on arm during surgery, Stelarc, 2008

Fig. 7: GFP Bunny, Eduardo Kac, 2000

in the laboratory of National Institute for Agricultural Research in France (INRA), to produce the first genetically modified rabbit, that was known as (Alba-Alba or GFP Bunny),which is a hybrid that glows green (phosphorescent) when it is exposed to ultraviolet light. Kac explained that "At the beginning, it was difficult, even for specialized audiences, to understand that bio art was precisely a new form of contemporary art; it was difficult for audiences to recognize what they had not previously recognized as the unique aesthetic principles of bio art" (Kac, 2020) (Fig. 7).

In Berkmen Laboratory, one of the research laboratories at New England Biolabs, artist Maria Penil Cobo creates her artistic works in cooperation with microbiologist Dr. Mehmet Berkmen and employs several types of bacteria. This method was a challenge and difficulty in the mechanisms of working and controlling a single environment that includes different growth processes over time. She wrote "our primary mission is to change the relationship between humans and microbes. "Using the universal language of art, bacterial art brings the invisible to the public's eye, increasing awareness, and raising curiosity" (Frankel, Temple, Dikener, & Berkmen, 2023:7). In 2015, their work (Neurons) won the scientific and artistic competition prize for the art of agar, which was launched by the American Society for Microbiology (ASM), through which it attracted those artists who were interested in dealing with living organisms (bacteria, fungi, germs). In 2023, in a statement on its website, the association announced the names of the winners of the ninth annual Agar Art Contest, and that was s participation that was beyond expectations. In the same year, the association received a record number of 390 entries from 37 countries (Urban, 2023). What distinguishes the competition is the division of participants into several categories. It gave the scientists, artists, hobbyists, and children, a platform to display their creative creations by using live microbes to draw pictures on agar (Urban, 2023). The art of agar depends directly on laboratory tools and media, and the risk rates vary according to the difference in the raw material and the methods of preserving it.

Artist Anna Dumitriu led the "Trust Me, I'm an Artist" project (2011-2017) with Professor Bobbie Farsides, of Clinical Ethics at Brighton and Sussex Medical School, and Lucas Evers, head of Manufacturing and Leadership Program at Wetlab. which aims to explore ethical considerations for artists who work in laboratories, biotechnology and biomedicine, and encourage innovation in the artistic production and audience development (Dumitriu, 2018), The project resulted in an art exhibition that brought many artists with diverse approaches together to work with materials. Nine artists participated in their artistic works, including gene editing, human tissue transplantation, the nuclear material commons, interspecies communications, smuggling of biological materials across continents, and the relationship between human rituals (EXHIBITION: Trust me, I'm an artist, 2017)

The shift to the laboratory produced a new intellectual approach to the artistic work. It is done by adding explanatory labels that help non-biology specialists understand the changes that occur in the organism and its environment, as is done by artist (Anna Dumitriu). She employed dangerous and infectious organisms and moved them from their own sterilized laboratory environment into the showroom, without any barriers or protective measures (such as cholera, tuberculosis, plague, and various types of organisms). She explained that "When I work with dangerous organisms, I cooperate with the appropriate laboratories to ensure that all necessary safety and bio containment requirements are met" (Clay, 2021:44). Taking the virus from the laboratory to the exhibition puts the recipient in a state of anxiety and direct confrontation with the effects of a deadly enemy. About her experiences, as in (Plague Dress - 2018), (Yesinia pestisbacteri), (Cholera Dress), and (Baptism). Bacterial Baptism, the artist wrote "When I was collaborating with Dr. James Price, we discovered that the textiles that infused with bacteria retained their colors when sterilized, which means that I could create works of art with them" (Clay, 2021: 44). In 2020, the artist won the best artwork prize in Microbial Arts Competition that was joined by Federation of European Microbiological Societies - FEMS to celebrate World Microorganism Day. An International Microorganism Day that aims to raise awareness about the

significance of microorganisms and microbiology research among the general public (The Winners of MicrobeArt2020 Are, in 2020).

The shift into a laboratory was accompanied by the opening of study branches in universities and holding of workshops, seminars, exhibitions, and research grants, as provided by incubating institutions that aim to enhance dialogue and criticism through the issues that are raised by bio art, as in SOLU Space laboratory under the management of Bio Art Society. This laboratory is equipped with state-of-the-art facilities for bio art research. It provides access to the specialized equipment and resources, enabling the artists and scientists to get engaged in experimental and practical work with living organisms and biological materials (Berger et al., 2023). The Society also plays a role in the scientific art initiative (Ars Bioarctica) (the project began in the fall 2008 in long-term cooperation with Kilpisjarvi Biological Station of Faculty of Biological and Environmental Sciences at University of Helsinki, to develop new types of scientific and artistic thinking) (Aarniosuo, 2020).

In 2011, SVA Bio Art Lab was founded by artist Susan Anker as part of a new facility for the Fine Arts Department of School of Visual Arts in New York City (Sabry, 2021) (Fig. 8). In this lab, the scientific tools and techniques become tools and techniques in artistic practice. SVA Bio Art Lab contains modern scientific microscopes and 3D bio printer. This machine can create living cellular tissues or non-living scaffolds. It seems to be an exceptional option for the researchers who are in need of support (Programs, 2018). The shift into a laboratory enhanced the educational objectives and created a new display media, which artists and scientists contribute to creating the art that enables the editing of complex scientific experiments and presenting them to the public by the use of the latest digital technologies and simulations in a simplified and exciting manner, as in Microbia Museum experience. It introduces the visitors to the significance of microscopic organisms, and displays invisible organisms by using various real and virtual means of display that are employed by laboratory devices and equipment. Jasper Buikx -Head of ARTIS-Micropia (Microbia, the first specialized museum for microorganisms) said that “The unique thing about it is that we grow 300 types of living microbes in our laboratory” (Calling, 2015). Thanks to experimental laboratories, museums are shifting from traditional content to creativity, and becoming living institutions (Haider, 2022). The status of the museum is constantly changing. Weil pointed out that there is currently a shift in the attitude towards museums, as the museum is no longer is appreciated only for its internal possessions, but by looking externally at the benefits it provides to the individuals and communities it seeks to serve (Weil, 2003).

Fig. 8: School of Visual Arts, SVA, New York

Research Methodology

This research applies a descriptive method in revealing the shift from the studio to laboratory. The descriptive method depends on studying the phenomenon, and is interested in describing and expressing it qualitatively. The descriptive method aims to describe what is

happening and obtain facts that are related to something, and clarify the possible shifts and changes and make predictions with future variables (Darwish, 2018). Data are collected from books, specialized exhibition guides, and personal interviews that are published on authentic websites of institutions and artists.

This review examines the artistic studies that have discussed bio art in the artistic works. In fact, several studies have discussed the concept of bio art in its different economic, political and ethical aspects. They refer to a range of ideas, and that gives the current research its significance when discussing the shift of experimentation and spatial environment that the artist occupies and his opening to a new culture: new work and display spaces.

Findings

Malea & Leonidas Karampinis (2014) discussed the ethics and practices that govern procedures for collecting and displaying Bio Art through a questionnaire to collect data from neighborhood artists, museums, and gallery visitors. The results showed that the majority of artists had advanced degrees and applied different forms of life. Some (77%) of bio artists were engaged in Bio Art through their research in fine arts, while a smaller percentage of (23%) were inspired by their interest in the biosciences. 85% of the alive artists face negative reactions from visitors, and half of them face reactions from directors of cultural institutions and other social groups. As a result, some bio artists intend to reconsider their use of bio materials in the future. Some bio artists face certain restrictions that are put on the use of bio materials due to legislation, ethical positions, or institutional rules, and also discuss the lack of a generally accepted ethical framework for the prod.

Cortabitarte (2015) puts forward the idea that in bio art humor is used as a rhetorical tool that holds the potential to present ambiguous and non-normative perspectives on ethical issues that arise due to the developments in life sciences and that is based on the dissonance theories of Henri Bergson and Arthur Schopenhauer, and the game theory of John Morell. It analyzes the performativity power of humor in the artistic practice of Adam Zaretsky, the self-proclaimed mad scientist and moralist who misbehaves. Through the case study, he argues that the detached mode of engagement elicited by aesthetic humor is crucial in allowing art to move beyond the normative and rational morality of academic discourse and embody multiple or even contradictory points of view simultaneously. This is why we welcome humor at its most beguiling, said Cortabitarte (2015:59).

Yetisen, Davis, Coşkun, Church, & Yun (2015) emphasize the evolving relationship between art and science, with highlighting the interdisciplinary nature of life sciences and the cultural and aesthetic contributions that life artists can make to scientific research. Some scientific laboratories show their willingness to collaborate with bio-artists. This study expects that galleries and museums will provide corresponding formal contexts for the public display of vital arts. The study also indicates support for institutions and companies by providing the laboratories that are available to live artists and to everyone, and they are equipped with low-cost versions of common laboratory equipment or with recycled tools and machinery from institutional and corporate sources. Yetisen, Davis, Coşkun, Church, & Yun (2015,732) argue that bio art, not only plays a role in critiquing and applying science, but also has the potential to help science understand itself in a better way.

Vaage (2016) highlights the ethical dilemmas that artists and their audiences face when engaging with bio-art, as it involves “tampering” with nature. The discussion emphasizes the potential impact of bioart on society and its role in shaping ethical frameworks and decisions regarding the use of biotechnology. Works of art can represent ethical issues visually and engage viewers emotionally and intellectually in ways that scientific research cannot. “Many bio-artists have emphasized that participants in interactive bio-art workshops gradually become aware of the ethical issues in what they actually do,” said S. Vaage (2016,102).

Slesingerova (2018) provides a critical social analysis of the debate on the social and cultural phenomenon of bio art in relation to bio power, through the works of specific artists who were interested in working with living or semi-living tissues and biotechnologies. Produced by artists Louis Beck, Heather Dewey Hagborg, and Piononymus, the text examines the artistic implications of bio work for current forms of power over life." "Our bodies, molecules, and genes come under the control of a broader stream of science- and technology-based practices that determine and invent new forms of life, new biological, or rather bio-digital".

Chistyakova (2020) discusses bio art within the framework of critical post-humanism It did so within the concept of Bios and Zoe between biological life and spiritual life, in which human centrality is dominant over other beings, and highlights the aspects of violence and immoral issues that hide behind the works. Bio-artist, Chistyakova (2020) Critical trans humanism is changing art and the way we engage with non-human life forms.

Grba & Todorović (2020) compare between bio art and generative art. Highlighting the conceptual and technical similarities, bio art is considered a continuum of complex and interesting software and hardware, and playfully exploits the fluid meaning of the adjective "natural," which traditionally reflects the contextual interests of the parties. Generative and lively artists are at their best when they nourish their critical self-awareness with knowledge, skill, and humor, and how these creative fields are inescapably human and thus always political.

Gemtou (2021) discusses the distinctive features of the biographical artworks with artworks from different eras, within a retrospective context as having paved the way for the emergence of biographical art. This is divided into two parts. The first one goes back to Aristotle, as he uses it to identify incomplete rhetorical syllogisms that connect all recipients with common questions. The second one is based on Levinson's historical theory, which shows that bio art belongs to the evolutionary narrative of art and artistic intentions.

Anker (2021) covers different aspects of bioart, such as iconography, artificial life, wet tooling, and the intersection of art and biological science. It addresses the impact of climate change on agriculture. Explaining how bio-art is not limited to a particular type of media or geographic location, and is an international movement with practitioners in different regions around the world, Anker (2021:1390) said that there are several sub-genres of bio-art: artists who integrate images and concepts from science Modern, in their work using traditional artistic media such as painting, sculpture, printmaking and performance art. They are the Artists who use computer software, systems theory and simulation to explore several aspects of biological science, through digital sculpture, new media installations, film and video. They are the artists who work directly with biological materials and wetware practices as a medium for their art.

Güneş Mutlu Avinç (2022) discusses bio art. Through the influence of nature on art, themes, concepts, techniques and materials are selected from "nature" in art and architecture with awareness of environmental protection.

Lopatkina (2022) Bioart discusses the post-industrial methods and how to employ them in favor of developing and finding ways to permanently control the human body. Bioart research not only changes the human race itself, but also changes the image of the artistic world as a whole. The human body gradually undergoes a change in its value that is prevailing in favor of mechanical improvements to its basic design.

Jacobs, Devleminck & Hannes (2023) reveal how new ways of knowing about environmental issues are generated through bioart. The study focuses on five artworks Microbiocene by Baum & Leahy, CMD: Experiments in Bio-Algorithmic-Politics by Michael Sedbon, Funkee: Fungal Supercoating by Emma Van der Leest, Fur_Tilize by Dasha Tsapenko and Becoming a Sentinel Species by Sissel Marie Tonn. "Biological art breaks through established ways of knowing and provides other ways of understanding the world we live in, and organism and artist engage in a co-creative process of living and making with each other", say Jacobs, Devleminck, & Hannes (2023: 61).

Ahmedien (2023) discusses the use of metaphors in bio artworks and how they shape understandings of biology. He explains that metaphors in bio art can be classified based on the relationship between biological concepts (source domain) and the way they are presented in the artwork (target domain). Explores different types of metaphors used in biographical art, including figurative metaphors, operational metaphors, and post-metaphorical metaphors. Figurative metaphors use conventional or non-biological means to represent biological concepts. While operational metaphors use biological materials in contexts separate from the actual concept being represented. In post-metaphorism, influenced by synthetic biology, source and target domains are mutually integrated. It highlights potential problems, such as oversimplification of biological systems and commercialization of genetic material. It also emphasizes the significance of considering the epigenetic factors and broader human identity beyond any genetic information in bio media-based artworks.

Conclusions

Throughout history, the studio environment witnessed several developments in technology, tools, performance, and style, which affected the artist's workplace, but did not remove him from it in the literal sense, while the shift to the laboratory was like a genetic mutation in shifts. After the shift to the laboratory, traditional art tools were replaced with technically complex tools and devices that are suitable for bio art. The shift forced the artist to cooperate with specialists in biology, medicine, and technology, to produce a work of art from living organisms. The effect of the shift to the laboratory was reflected in the use of laboratory devices and equipment as part of the elements of the artistic work inside the galleries.

While performing surgical operations became part of the artistic performance in front of a live audience, the event was photographed and broadcast to a distant audience outside the exhibition. Certain scientific institutions contributed to establishing collaborative laboratories between artists and scientists by providing a financial support and residency programs, and attracted non-specialized groups of amateurs and university and school students by holding exhibitions, competitions, and awarding prizes. Institutions and museums invested in the creative artistic experiences within the laboratory, and used it as a contemporary cultural and social awareness tool, by creating interactive and educational laboratories and galleries. Shifting into a laboratory required the artist to adhere to the conditions and protocols of prevention and safety, in order to work within some laboratories, which is a new environment in the production of artistic works. The shift from the studio to the laboratory resulted in the production of hybrid and strange works were loaded with a nature of astonishment and shock, in a manner consistent with contemporary artistic goals.

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References

A. Edwards, D. (2010). The Lab, Creativity and Culture. United State: Harvard University Press.
Aarniosuo, A. (2020). Bioart Society: Annual Report 2020. Finland: Bioart Society.
Abbas, R. A. (1996). John Locke, Imam of Experimental Philosophy. Beirut: Dar Al-Nahda Al-Arabi.
Ahmedien, D. A. (2023). Analysing bio-art's epistemic landscape: from metaphoric to post-metaphoric structure. BioSocieties, 18, 308-334. doi:https://doi.org/10.1057/s41292-022-00270-y
Al-Bayati, S. J. (2023) The new aesthetic in contemporary world painting. Al-Academy, 287–302. https://doi.org/10.35560/jcofarts1226
Anker, S. (2021) Epistemic practices in Bio Art. AI & SOCIETY, 36, 1389–1394. doi:https://doi.org/10.1007/s00146-021-01152-w
Berger, E., Mari K. K., Marietta R. & Line T. (2023) State Of The Art - Elements for Critical Thinking and Doing, Helsinki: Bioart Society.
Buchanan, I. (2011) The Clutter Assemblage. DRAIN Journal of Contemporary Art and Culture,-Power, 8(1), 1-7. http://drainmag.com/the-clutter-assemblage/
Calling, A. (2015) Micropia: See the Invisible Amsterdam [Video]. youtube. https://www.youtube.com/watch?v=g6zvy3wLYpU&t=27s
Catts, O. & Zurr, I. (1996) Tissue, Culture & Art project. Retrieved from Tissue Culture & Art project: https://tcaproject.net/about/
Catts, O. & Zurr, I. (2017) Vital Tissue Constructs, Charissa N. Terranova, Meredith Tromble, The Routledge Companion to Biology in Art and Architecture, UK: Routledge.
Century, M. (2013). Pathways to Innovation in Digital Culture. Canada: Centre for Research on Canadian.
Chistyakova, M. (2020) Bio-Art Between Bios and Zoe. Fourth International Scientific Conference Communication Trends in the Post-literacy Era: Multilingualism, Multimodality, Multiculturalism (pp. 390-398). Yekaterinburg, Russian Federation: KnE Social Sciences. doi: DOI 10.18502/kss.v4i2.6356
Clay, A. & Timothy J. (2021) On Media, On Technology, On Life - Interviews with Innovators, Denmark: River Publishers. https://doi.org/10.13052/rp-9788770225946
Coles, A. (2012) The Transdisciplinary Studio. London: Sternberg Press.
Cortabitarte, I. D. (2015). "It's not a joke!" Bio-art and the aesthetics of humour. European Journal of Humour Research, 3(2), 50-61. http://dx.doi.org/10.7592/EJHR2015.3.2.3.desenacortabitarte
Da Costa, B., & Philip, K. (2008) Tactical Biopolitics- Art, Activism, and Technoscience. United States: MIT Press.
Darwish, M. A. (2018) Research methods in the human sciences. Egypt: Arab Nation Publishing and Distribution Foundation.
DNP. (n.d.) What is Museumlab? Retrieved from Louver- DNP Museum Lab: https://www.museumlab.eu/greeting/theme/index.html
Dumitriu, A. (2018) Trust Me, I'm an Artist: Building Opportunities for Art and Science Collaboration through an Understanding of Ethics. Leonardo, 51(1), 83-84. doi:https://doi.org/10.1162/LEON_a_01481
Eve Frankel, Jasmine Temple, Eliz Dikener, Mehmet Berkmen (2023) Bridging the gap with bacterial art, FEMS Microbiology Letters, 370, 1-7, https://doi.org/10.1093/femsle/fnad025
EXHIBITION: Trust me, I'm an artist. (2017) Retrieved from zone2source: https://zone2source.net/en/tentoonstelling/waag-society-trust-me-im-an-artist-3/
Exploratorium Arts (2014) San Francisco: Exploratorium. Retrieved from https://www.exploratorium.edu/arts

Gemtou, E. (2021) The Artistic Status of Bio-art. National and Kapodistrian University of Athens, 13(1), 1- 13. doi:DOI: 10.21659/rupkatha.v13n1.02
Gombrich, E. (2016) The Story of Art. (A. Hudayfa, Trans.) Manama: Bahrain Authority for Culture and Antiquities.
Grba, D., & Todorović, V. (2020) Rendering life: Transgressive affinities between bio art and generative art. Technoetic Arts, 223-238. doi:https://doi.org/10.1386/tear_00040_1
Haider, M. (2022) Museum Practices in the Twenty-first Century (Museums and Change). In A. Chaaya et N. Elias (éd.), Arts & Archaeology manual. Beirut: Faculty of Letters & Human Sciences publications, Lebanese University: 327-337 (in arabic).
Harrison, M. (2006) In Camera: Francis Bacon: Photography, Film and the Practice of Painting. UK: Thames & Hudson.
Ionat, Z. & Catts, O. (2023) Tissues, Cultures, Art. Switzerland: Springer International Publishing.
Jacobs, A., Devleminck, S. & Hannes, K. (2023) Co-Creatively Producing Knowledge with Other-Than-Human Organisms in a (Bio)Technology-Controlled Artistic Environment. Social Inclusion, 11(3), 51- 64. doi:doi:https://doi.org/10.17645/si.v11i3.6609
Johung, J2019) .) Vital Forms: Biological Art, Architecture, and the Dependencies of Life, New York: University of Minnesota Press.
Jones, C. A. (1996) Machine in the Studio: Constructing the Postwar American Artist. Chicago: University of Chicago Press.
Kac, E. (2005) Telepresence & Bio Art: Networking Humans, Rabbits, & Robots. United States of America: University of Michigan Press.
Kac, E. (2007) Introduction, Art that Looks You in the Eye: Hybrids, Clones, Mutants, Synthetics, and Transgenics. Cambridge: MIT Press.
Kac, E. (2020) GFP Bunny at 20. Journal of Posthuman Studies, 4(2), 119- 128. doi:https://doi.org/10.5325/jpoststud.4.2.0119
Kelley, L. (2016) Bioart Kitchen, Art, Feminism and Technoscience. London: Bloomsbury Publishing.
Kenway, J., Elizabeth B., Johannah F. & Simon R. (2006) Haunting the Knowledge Economy, Ukraine: Taylor & Francis.
Kosolapov, A. I. (2020) The Art and Science of NDT at the Hermitage Museum. (J. Ross, Ed.) The NDT Technician (TNT), 19(3), 1-5.
Koursari, E. (2020) And the winners of #MicrobeArt2020 are... FEMS. accessed on 2nd January 2024 https://fems-microbiology.org/and-the-winners-of-microbeart2020-are /
Lopatkina, M. A. (2022) The Concept of Bio-Art in the Culture of Post-Industrial Society. Culture and technologies studies, 7(1), 33- 44. Retrieved from http://cat.itmo.ru/en/2022/v7-i1/309
Lowenberg, K. (2014) New Study: Art Therapy May Build Self-Esteem in People Living with Epilepsy. Retrieved from Epilepsy Foundation: https://www.epilepsy.com/stories/new-study-art-therapy-may-build-self-esteem-people-living-epilepsy. accessed in 3 December 2023.
Malea, E., & Leonidas Karampinis, E. K.O. (2014) Field research on the ethics and practice regarding the operation of Institutions hosting BioArt Collections. In ICOM-CC 17th Triennial Conference Preprints (pp. 1-8). Melbourne, Australia: Paris: International Council of Museums. Retrieved from -https://www.researchgate.net/publication/311395519
Muhammad, B. (2015) Art and architecture. Baghdad: Al-Fath.
Mustafa, B. (2018) Paths of postmodernism: motives and starting points. United Kingdom: Hindawi Foundation.

Mutlu Avinç, G. & Selçuk, S. A. (2022) On the Evolution of Art and Nature Relationship: Bio-Informed Art. AM Journal of Art and Media Studies, 27, 57-74. doi:DOI:10.25038/am.v0i28.493

Parker-Starbuck, J. (2013) Reflective Viewing ORLAN's Hybridised Harlequin, Banksy, Bacon, and the Animal-Human Divide. In F. W. Causey, Performance, Identity, and the Neo-Political Subject. New York: Taylor & Francis.

Reichle, I. (2009) Art In The Age Of Technoscience- Genetic, Engineering, Robotics, And Artificial Life In Contemporary Art. New York: Springer.

S. Vaage, N. (2016) What Ethics for Bioart? NanoEthics, 10, 87-104. doi:DOI 10.1007/s11569-016-0253-6

Sabry, F. (2021) Kweekvlees: Hoe kunnen we een borst of een vleugel laten groeien in plaats van een hele kip, Dutch: Een Miljard Goed Geïnformeerd.

Slesingerova, E. (2018) Biopower imagined: Biotechnological art and life engineering. Social Science Information, 57(1), 59- 76. doi:DOI:10.1177/0539018417745164

Star Rogers, H. (2022) Art, Science, and the Politics of Knowledge. United State: MIT Press.

SVA Artist Residency Programs (2018, February 6) Bio Art: From the Laboratory to the Studio. [video] Retrieved from vimeo: https://vimeo.com/254583765

Thackerc, E. (2007) Open Source DNA and Bioinformatic Bodies. In E. Kac, Signs of Life Bio Art and Beyond (pp. 31-41), The MIT Press.

Urban, J. (2023, December 13) ASM Announces 2023 Agar Art Contest Winners. Retrieved from American Society for Microbiology: https://asm.org/Events/ASM-Agar-Art-Contest/Winners

UWA Research Impact. (2018, October 18) SymbioticA: provoking dialogue about artful science. Retrieved from The University of Western Australia: https://researchimpact.uwa.edu.au/research-impact-stories/symbiotica/

Wallace, I. (2014, June 11) The Evolution of the Artist's Studio, From Renaissance Bottega to Assembly Line. Retrieved from Artspace: https://www.artspace.com/magazine/art_101/art_market/the-evolution-of-the-artists-studio-52374

Weil, S. E. (2003) Beyond Big and Awesome: Outcome-based evaluation. In R. R. Richard Sandell, Museum Management and Marketing. London: Routledge. doi:https://doi.org/10.4324/9780203964194

Yetisen, A., Davis, J., Coşkun, A., Church, G. M. & Yun, S. H. (2015). Bioart. Trends Biotechnol, 33(12), 724-734. doi:DOI:10.1016/j.tibtech.2015.09.011