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Communicating tissue culture as art

Ionat Zurr
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Communication Tissue Culture as Art

by

Jonat Zurr

at

Edith Cowan University

This thesis is presented for an Honours Degree of Bachelor of Arts at the
School of Photomedia and Media Studies,

1998

USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.

Declaration

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Signature.....
Date...*25/7/1998*.....



COMMUNICATING
TISSUE CULTURE
AS ART

BY

IONAT ZURR



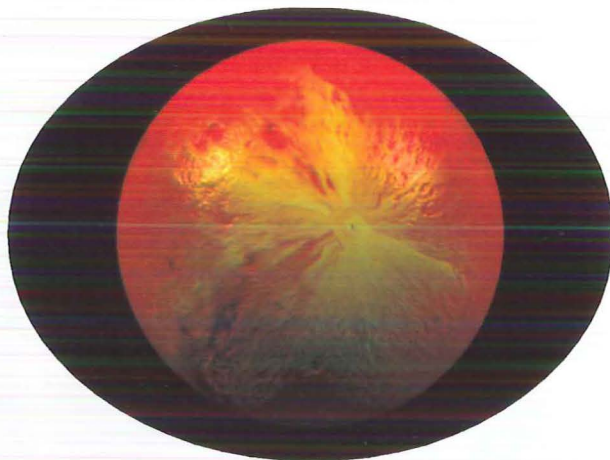
COMMUNICATING TISSUE CULTURE AS ART

ZURR

1998

BA (Hons)

SUPERVISOR:
Katrien Jacobs



ACKNOWLEDGMENT
oron catts &
Jacque show &
the bodies and people supporting this project
especially PICA
thank you!

* NO ANIMALS WERE DIRECTLY HARMED AS A RESULT OF THIS PROJECT.

ABSTRACT

Biologically related technologies are developing rapidly. Their effects will shape the future of human society and the human environment. This paper examines, through the discipline of Photomedia, possible futures dominated by biologically related technologies. More specifically, it explores the relevant issues through the art project called 'Tissue Culture & Art' (therefore refer to as TC&A). TC&A is a research and development project which explores the use of tissue culture and tissue engineering as a medium for artistic expression.

Biologically related technologies can be used as a source for questioning the traditional meta-dichotomy of nature versus culture. TC&A redefines the terrain of what is natural/living and what is artificial/non-living. The art of the 60's and 70's emphasised discourses of nature by opposing human culture and technological progress. The Post-Human art of the 80's and 90's investigated enthusiastically technological hype focusing on the human individual as the source of the art expression. The TC&A project attempts to combine some of the conflicting ideologies of these art movements into a new evolutionary stage, by combining discourses of nature and cultural progress. Through the theme of biologically related technologies TC&A investigates the creation of a high-tech "nature" which will sustain the survival of both, the environment and humans (whatever kind they will be).

Furthermore, this paper looks at reducing the gaps created by different paces of evolutions (biological, cultural and techno-scientific) which are accompanied by a lack of corresponding social values and social adaptation. The paper offers an approach which integrates art and science disciplines and communicating them to the wider community.

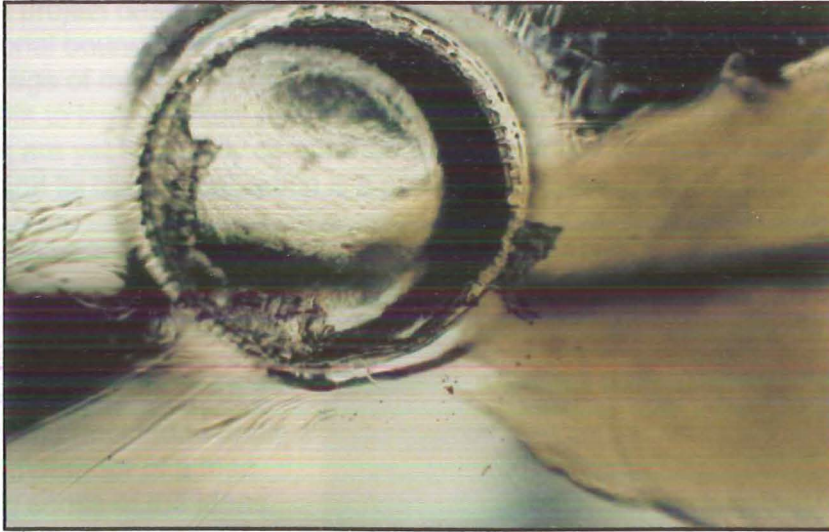
This thesis contains textual analysis, graphic maps and TC&A visuals in order to explore and imagine the Terra Incognita of the future.



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1.0 Introduction:

This thesis is written in the strong belief that biologically related technologies are going to have a dramatic effect on our future. As predicted by Eckersley and Jeans (1994), from CSIRO, by the year 2020 biotechnology will be the fastest growing industry in Australia, and its development will play an important role in the future of Australia and the world.

The fast rate of technological development far exceeds corresponding social values and norms. As acknowledged by Ezio Manzini¹ (1993), the new relationships with technology derive from the fact that the speed of technological progress exceeds the speed of social adaptation (p.5-20). This situation is becoming even more extreme in the light of developments in biological science and its related technologies. After all, 'Genetic engineering is not just another life-enhancing technology like aviation or telecommunications. Its continued development and application may force us to redefine the parameters of life' (Deitch, 1992, p.29).²

In this thesis I will explore traditional dichotomies of the natural versus the human-made by referring to an artistic project called Tissue Culture & Art (hereafter referred to as TC&A). This paper includes an illustration and analysis of Stage One of this project which utilises biologically related technologies of tissue culture and tissue engineering as a medium for artistic expression.

The TC&A project is an art expression which is interested mainly in raising questions and encouraging debate for a better understanding and participation in a future that becomes increasingly techno-scientifically dependent, and techno-scientifically constructed. That is, a future in which the use of organic systems may replace and/or seamlessly interact with human-made structures to the extent that our cultural perception of what is alive and what is artificial will be redundant.

¹ More about Ezio Manzini and his writings in Chapter Two.

² Jeffery Deitch's writings on biologically related technologies in relations to Post Human art are illustrated in Chapter Two.

Before I give a thorough description of the project and its agenda I would like to stress the idea that the TC&A project deals physically and conceptually with breaking rooted dichotomies and blurring traditional boundaries for the purpose of questioning the validity of these dichotomies in the age of rapid development in biologically related technologies. The TC&A project also attempts to look at future possibilities and future scenarios created by these technologies which are yet to be fully comprehended. As a result the attempt to make sense of the TC&A Project and its conceptualisation is a problematic one.

As a visual artist who is aware of the power of visual and graphic representation of information and aware that more than half of the human cortex is devoted to vision (Hall, 1992, p. 15 & Stafford, 1993, p.474) I decided to apply Stephen S. Hall's³ metaphor of a map as an aid in making sense of the ideas governing this thesis. This paradox of making sense of blurring boundaries by constructing new ones is self evident in Hall's assertion of humans' physical and mental dependency on borders and outlines as a mechanism for gathering information, comprehending it, and making sense of it.

It is important to note that the borders Hall refers to are not objective and solid ones, but rather a person's inner conceptual construction created by the gathering and processing of physical, social and personal data. These borders are changing as a result of change in information and knowledge as well as change in social and/or personal understanding of that information.

Hall writes: More than half the human cortex is involved in vision, and much of vision and perception is built upon the ability to distinguish borders and outlines. Through the process of perception, the information ...enters the wily dimensions of the human mind...the mind takes hold of it and transforms it into a tool of thought, and we begin to think about the world in a different way (Hall, 1992, p.14-15).

Future Scenario One:

Imagine a world in which living and non-living entities symbiotically interact to form our environment. Try to employ what Kelly coined as the "liquid logic" of a neo-biological cyberculture, when you join me in a futuristic journey inside a "biomade" (biological made) living room: (Before entering, take your shoes off...).

Description:

You walk inside a room in which the floor and walls are all covered by texture with no specific boundaries. Different patterns are intertwined together with no definite beginning and no end. Some of them remind you of organism's skins (reptile's skins are the dominant ones, conforming to the current fashion stream). Some patches of the space surrounding you look like an unfamiliar bio-matter texture, a pattern you have never seen before. It takes you time to adjust to the sensations you feel under your bare feet. You use your hands and rub your skin into the walls. To your surprise it feels alive.

Explanation:

The floor and the walls of the living room are made of Genetically Modified Independent Tissues (Catts, 1996). A central control unit such as a computer (or a Bio-computer) is controlling a system which integrates elements of living tissues and micro-organisms as well as mechanical and electronic devices. This symbiotic system creates a mini-eco system which enables utilisation of materials made by the biological elements for a "better" environment. For example, parts of the wall are equipped with chlorophyll that is capable of photosynthesis. The carbohydrates that are made in the photosynthesis process provide energy to other tissues. In other parts of the walls the combination of tissues and micro organisms are "fed" by the consumption of bio-processed domestic waste (made by you...) that keeps them alive. The living tissues and micro organisms provide an aesthetic and protective coating for the walls. The floor is designed to be self-cleaning by directly consuming organic-based dust and dirt. (A fantasy of every house-husband/wife).

³Stephen S. Hall in his book *Mapping the Next Millennium: The Discovery of New Geographies* looks at the new possibilities created by digital mapping techniques. The book is an excellent source of illustration and explanation of current and futuristic practical utilisation of scientific development. Hall also looks on the social implications of such technologies.

A schematic map will be attached to each chapter. This map will outline the boundaries in question and the position of the TC&A project in addressing these boundaries.

1.1 What is the Tissue Culture & Art Project?

The TC&A project is concerned with the use of artificially grown living tissue as an independent tissue (that means living tissue that is sustained alive and grows not as part of an organism but with artificial support) and combining it with human made structures to create an artistic entity. The idea of combining living tissue and human-made structures to create artefacts and visual artworks (using Remote Sensing Imaging among other techniques) is at the core of TC&A.

This thesis does not attempt to be a technical manual for growing tissue over human-made structures but rather a discussion validating such activity as an artistic process, the conceptualisation behind it and its futuristic implications. The project is an open process which is photographed and documented. Furthermore, the images produced are not scientifically "objective", and are further manipulated artistically. The artists consciously avoid the scientific titles and discourses usually accompanying imaging of this sort. The project attempts to generate philosophical and cultural debate beyond the use of "cutting edge" technology, and therefore relies for its development on public participation. The process of this project is documented visually, artistically, and verbally via a specialised web site. This web site is designed to draw feedback and comments from around the world. People from different places, backgrounds and disciplines are able to put their own input into the project. This interaction is an integral part of the conceptualisation of the project. (See appendix 1).

1.1.1 The Materials and Technologies:

Tissue engineering is broadly defined as:

The application of the principles and methods of engineering and the life sciences towards the development of biological substitutes to restore, maintain or improve functions. It is an area which is emerging in importance worldwide (on-line, Biomednet).

According to Langer and Vacanti (1995), Tissue engineering will enable scientists to grow complete organs in vitro conditions, using biomaterials and polymers as scaffolding for the tissue (Langer & Vacanti, 1995).

In regard to the above, the TC&A project asks a fundamental question: if it is possible to grow complete organs why not grow new forms and shapes and maintain them independently (artificially sustained alive)?!

Many of the images produced by TC&A are further treated with image manipulation computer softwares, such as Adobe Photoshop, Premier (for video editing), and 3D modelling softwares.

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1.1.2 The Institutions Supporting the Project:

The TC&A Project is supported by Research and Development Funding for a Multimedia and Hybrid Arts Grant, from the Perth Institute of Contemporary Art 1997.⁴

The training in tissue culturing is done in the Department of Anatomy and Human Biology at the University of WA, under the supervision of Prof. Mirenda Gurands, and the Biomaterials Research Centre (a division of The Lion's Eye Institute).

The training in Confocal Microscopy and Environmental Scanning Electron Microscopy was done by the author of this thesis in the Centre for Microscopy and Microanalysis in UWA in Nov-Dec 1997, and Feb 1998.

Computer hardware and software is available in the Department of Photomedia in ECU and the Department of Anatomy and Human Biology in UWA .

See Appendix 2 for letters of support.

Stage One of the TC&A project experimented with tissue growth over glass: The growth of different cells (such as epidermal cells and T3T) on different glass shapes are the art works presented in this thesis.

The images presented in this paper are only a sample of a wider collection to be exhibited this year.



1.2 The TC&A Project in the context of the thesis:

TC&A artefacts which are visually represented in this thesis, are a tangible production of a broader idea underlying this thesis. The TC&A project utilises biologically related technologies as an artistic expression to focus our attention on the fact that these technologies are already existing and being utilised, and will have an even more dramatic effect in the future. One has to mention the ear which was grown on a mouse's back, or the growth of organs in vitro conditions, in order to realise the enormous importance these technologies have and will have on society and the environment, in the near future. One has also to remember that these techniques are being practised in a wider context of human existence; they are enwrapped in the economic and social fabric of current times; the growing tendencies in economic rationalism, and Western hegemony. Some people might perceive TC&A artefacts as bizarre, extreme, or monstrous. These reactions just emphasise the importance of the project in generating social debate and social awareness in relation to biologically related technologies.

⁴The TC&A project - Stage Two, is supported by the New Media Arts Fund of The Australian Council for the Arts 1998.

This thesis is divided into three main chapters:

Chapter One locates the TC&A project in art history and art discourses. This chapter focuses on the meta-dichotomy of nature versus culture. The TC&A project presents biologically related technologies as an art expression which combine the natural/organic and the non-organic/human-made into one entity.

Chapter two is concerned with the environment and ecological issues. It investigates the border separating biological evolution and cultural evolution. The TC&A project offers the introduction of human-made/organic entities to our urbanic environment as a way to reduce the gap between biological evolution and cultural development.

Chapter three investigates the borders separating art and science disciplines. The TC&A project represents a tangible way to incorporate the two disciplines and communicate them to the wider community.

It seems to me that humanistic disciplines do not yet address fully the issues raised by human ability to manipulate the core of living. This paper looks at these issues from an artistic perspective which tends to question and juxtapose traditional views and perceptions in a creative and imaginative context, to link things that are supposed to be unlinkable, and to dare to think and present the unthinkable and unpresentable.





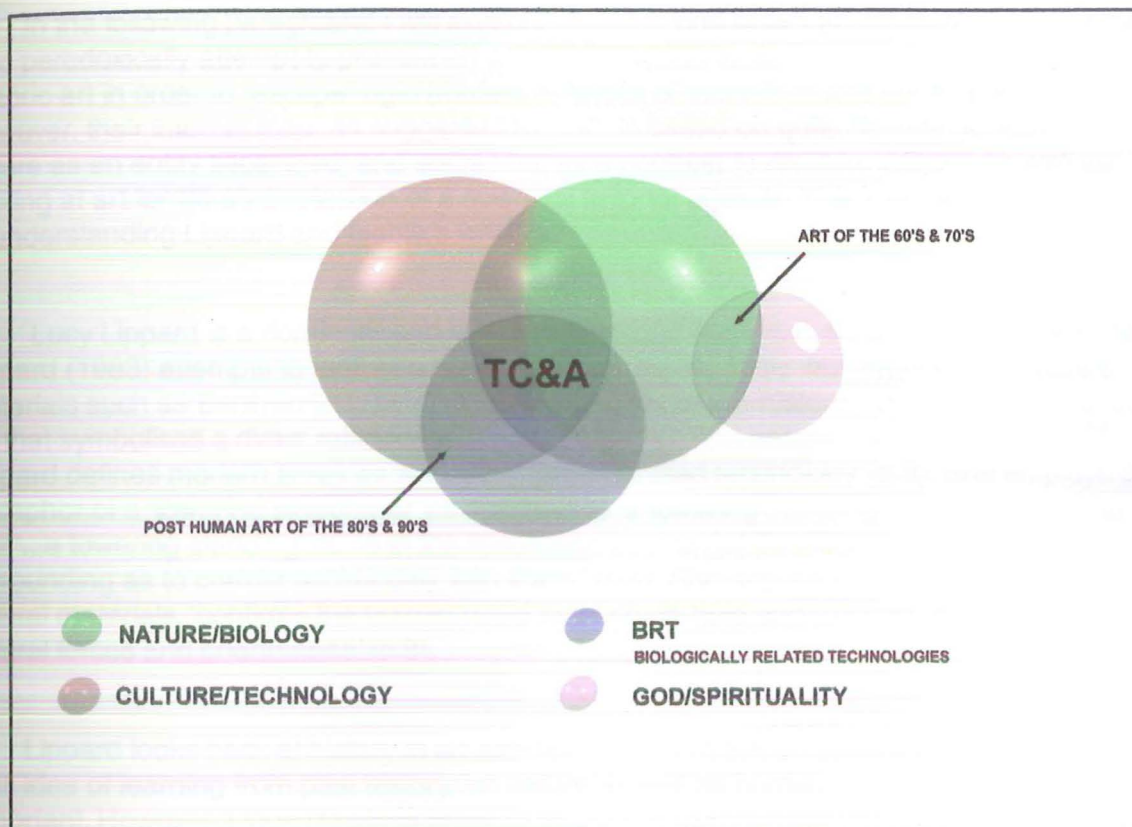
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SPIRAL

CHAPTER ONE:

2.0 ARTISTIC ISSUES



The TC&A Project combines nature and culture through the theme of biologically related technologies. It explores the possibility of a high-tech nature. The theme of nature versus culture was (and is) explored rapidly through art discourses. After all, in Bruno Latour words, 'the very notion of culture is an artefact created by bracketing nature off' (cited in Penley & Ross, 1991, p.21).

In this chapter I will firstly examine art movements of the sixties and seventies as seen by art critics such as Lucy Lippard and Suzy Gablik. Secondly I will explore the Post-Human art in relation (and as a reaction) to the art of the sixties and seventies. This discussion will lead me to the TC&A project as an art expression questioning the existence of dichotomies surrounding nature (natural, organic, animate, living) /culture (artificial, non-organic, inanimate, non-living).

2.1 Art of the 60s and 70s:

The art of the sixties and seventies involved art expressions such as Happenings and Environmental art as well as Earthworks. These art expressions carried ideologies which were based on the basic dichotomy of nature versus culture. Nature carried connotations of an entity not controlled and not dominated by humans and their intentions (hence their consciousness). Culture carried somewhat negative connotations of a "critique of enlightenment". Human

consciousness meant the destruction of nature by technology and urbanisation, and the destruction of the human habitat and life by sophisticated war machinery. Scientific-technological thought was associated with the negative effects of "progress".

One has to remember the historical context of this period was (justifiably) dominated by the shadows of the Second World War. The realisation that the destructive power of humans, with the aid of their technological and scientific tools, led to a rejection of human culture in favour of a supposed return to a nature not dominated by humans.

In the following paragraphs I will illustrate the opinions of two art critics of this movement who paradoxically attempt to present an art critique which looks back at discourses of pre-historic art in order to "escape" rigid borders in favour of more fluid and spiritual analysis. However, their internal map, as suggested by Hall, is based on quite definite outlines portraying nature as an entity separated, and somewhat as a contrast to Western culture, as well as looking at art for life as a rejection of a scientific rational agenda. This internal map is a key point in understanding Lippard and Gablik's writings.

Lucy Lippard is a dominant and influential feminist American art writer, activist and curator. Lippard (1983) attempts to look at contemporary art which deals with nature and nature's materials such as Earthworks¹, by reflecting on the art of pre-history. She maintains that this is art that symbolises a direct relationship between human and nature, as well as art and life. Lippard defines modern times as 'an age of dehumanised technology' (p.8). She employs the metaphor of a 'towering skyscraper' as opposed to 'a towering standing stone' and maintains that '...a towering standing stone in the landscape seems not so much to dominate its surrounding as to coexist sensuously with them' (p.8). She argues that such work, built from natural materials, 'confirms the human need to touch, to hold and to make, in relationship to natural forces and phenomena' (p.8).

Lippard looks back at history in an attempt to reflect back on current and future society. This idea of learning from past history, on nature as well as human culture is extremely important. However, Lippard seems to apply traditional dichotomies (that might apply in the past) when reflecting on our future. Our society, with its acquired knowledge of biological science and its related technologies, raises problems that did not exist before, problems which make the traditional physical and conceptual borders, of what is known and what is possible, not always relevant and appropriate. Hall, just like Lippard, looks at history in appreciation and asserts that previous constructions of maps

can be seen as diagrams showing the evolution of our collective thought about a particular spatial domain, and as archival images documenting states of knowledge. They help us appreciate those who attempted to explore the same terrain in earlier epochs with less adequate instruments of measurement (Hall, 1992, p.23).

However, it is Hall who emphasises the fluid nature of a human's conceptual borders. In his book he illustrates the recent developments in science and technology which put our traditional views in question. For example; some of the "natural" foods served in our homes, have been genetically engineered. The food is still grown "naturally", however its DNA is being artificially manipulated to contain different attributes. Such food is an integration of nature and culture.

A more fundamental border being questioned by biologically related technologies is the border of life and death. Tissue culture techniques enable extending the life of only parts of the organism and growing it, even when the organism itself ceases to live. The question being asked

¹Earthworks art explored the use of natural materials such as earth, rocks and plants to design works of art that would merge with or counterpart with their surrounding natural landscape. (Preble, 1989, p.438). Natural, in the context of Earthworks, probably meant organic materials positioned as part of a non-urbanic landscape.

is, if parts of the organism are alive and growing, is the organism alive or dead?

Hall encourages extending and changing borders as part of human development. Lippard, on the other hand, seems to hold the same conceptual map dominated by the meta-discourse of nature/natural versus culture/human-made when making sense of the past and of a possible future.

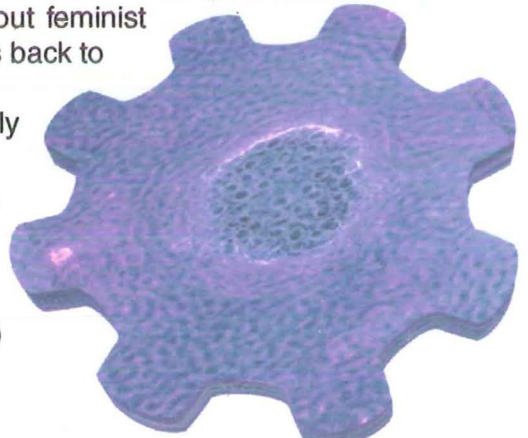
Furthermore, our contemporary knowledge about nature de-mystifies (or de-romanticises) it. With our current knowledge of nature, and current ability to control (to a certain extent) natural processes, it is impossible to return to the pre-historical relationships with nature which were based on the belief in magical gods. One has to think about Dolly, the cloned sheep, in order to question the "magic" of reproduction.

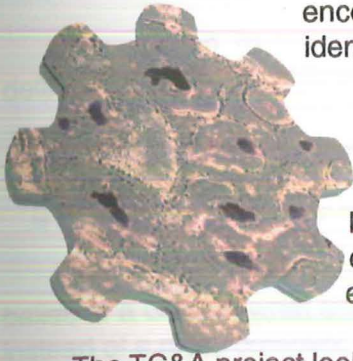
Lippard's solution for a reconciliation, between nature and culture, does not push the boundaries enough. According to her, by adopting themes from pre-historic art forms such as "natural" materials, and pre-historic "natural" rituals, modern people can re-establish ties with their natural environment. Naturally, it is easier to believe that we can understand or relate to our past relationship with the environment, than to perceive unknown future relations. We also tend to adopt a nostalgic look at simple, symbiotic relationships between humanity and the pre-industrial environment. The attempt to look for answers about the yet unknown or/and the ever existing injustice as part of human history, drives artists to look back at history. This is a 'return to a lost innocence, which had never been innocent at all. [It is a] "nostalgia without memories".' (cited in Penley & Ross, 1991, p.xiii).

2.1.1 Nature/Feminine Vs Culture/Masculine:

To better emphasise the difference between Lippard's understanding of nature and culture and the TC&A approach to this dichotomy, I would like to refer to a sub dichotomy. A sub dichotomy derived from Nature/Culture is gender construction. According to Lippard it is the feminine position with nature, as opposed to the masculine and culture dominated by hegemony. The masculine is allied with technological progress, with rational thought and science.

Lippard looks at the feminine position as a source for the return to nature, either as the feminine in opposition to the masculine discourse of modern progress and urbanic western hegemony, or as an essentialist point of view in which the feminine by its nature has closer ties to what is natural. Again, Lippard maintains the dichotomies of masculine/culture versus feminine/nature. These dichotomies tend to be used as a restraint rather than a free approach to the complexities of what are the relations of nature/culture, and what is gender. Mark Dery (1996), a cyberculture thinker and writer, writes about feminist works of the sixties and seventies and how feminism 'harks back to ancient matriarchies and prehistoric goddess worship for a vision of the feminine unmediated by the male gaze...heavily invested in mystical ecopolitics symbolised by loamy, generative Earth' (p.159). Again, feminist art, paradoxically, constrains itself to the limitations of a binary construction of gender, which leads to feminine essentialism in the sense of closer relations to the natural and therefore pre-historic discourses. As feminist scholar Judith Butler (1991) maintains, 'there is the political problem that feminism





encounters in the assumption that the term *women* denotes a common identity' (p.3).

Post modern ideologies (and artistic discourses of the era) treat this problem by a further play with the notions of the sexual body and the gendered self. Post modern art challenges the boundaries of the integrated self, the construction of gender, and the essentialist natural self. The self is a social construction that can be enjoyably (or forcefully) played on.

The TC&A project looks at blurring these dichotomies even further, working from a different resolution, a more basic one: The integration and growth of the basic life unit - that of the cell. It presents questions about what is alive **whether female, male, androgynous or non-human**. It maintains there will be a future in which humans will be able to reconstruct their bodies in shapes and forms that will emphasise the grey area of what is between men and women, as well as what is outside of that realm, possibly other organic life forms as well as non-organic machinery.

2.1.2 Art for Life:

Lippard's way is to construct the meaning of art as drawn from the idea of recalling 'the function of art by looking back to times and places where art was inseparable from life' (1983, p. 4). She comments on environmental artists rebelling 'against reductive purism and an art-for-art's-sake...with a gradual upsurge of mythical and ritual content related to nature and to the origins of social life' (1983, p. 5). The position of art based on the dichotomy of culture/nature, which still relates very much to social life, is at a cross-road: new technologies and advances in science present other conceptions of what is natural and what is human-made, looking at a different angle on the mystique and rituals of the pre-history era. Biologically related technologies are dealing with the basic units of life. These technologies enable humans to isolate them and reconstruct them. In many ways these technologies empower humans to play "God", and, with the right scientific knowledge and technological tools, to create magic.

Nevertheless, our cultural rituals and art for life cannot any more be detached from these aspects of biologically related technologies. These technologies will radically affect humans and their history. The TC&A project acknowledges these facts and attempts to utilise scientific processes and technological tools to initiate the possible new rituals of the future. These are rituals which are accompanied by social discussion and debate as well as social interaction and play that will stimulate a discussion questioning the appropriation and validity of traditional boundaries and concepts, and the reconstruction and even creation of more suitable guidelines and ethics in current society. They are rituals that will enable society to adapt to rapid changes.

While Lippard attempts to combine contemporary art with pre-historic materials and discourses, Gablik (1984) projects a mournful tone in relation to modern time and modern art. Gablik argues that the main problems surrounding the loss of the sacred feelings which unite humanity, are the basis for all art:

One of the deepest distinctions between other historical periods and our own is that whereas in the past, belief and hope permeated all human activity - and art had a clear consensus behind it - our own epoch is characterised by disbelief and doubt. Ideas that were once quite clear and satisfactory have become vague or irrelevant (p.14).

Her solution to our cynical modern times is to search for the sacred, which is vaguely defined by her as a spiritual, sacramental experience:

challenging the oppressive assumptions of our secular, technocratic Western mentality...Our culture expects us to be manic - to overproduce, to overconsume, and to waste - but in all this, something vital is missing: the knowledge that life can be transformed by a sacramental experience (p.128).

It seems to me that Gablik, in her frustration with current society, regressed to look for a belief, or a God (in what shape or form she may be). Again, the look for a consensus solution, instead of a more complex, problematic and, in some sense paradoxical, search for more knowledge, will usually converge into the idea of the sacramental and the mystical. This is combined with a nostalgic look at past times, which seems to be more coherent (and better) to us than the unknown future.

Gablik, as a result of her dissatisfaction with the unresolved complexity of modern times, comments generally on the faults of current capitalist society in an emotional way:

Capitalist society, although it has gone beyond previous societies in economic development, and still further beyond them in science and technology, cannot hope to produce art equal to that of certain earlier forms of society - since capitalist production, because it stresses the profit-making value of art and turns it into a form of merchandise, is hostile to the spiritual production of art (p.29).

The use of the word spiritualism as a source for providing real art, might seem a simplistic one. Art even in pre-historic times, has had problematic relations with society at large, with its economic relations and power relations in general. I would even argue that art is a source of reflection on social life, and part of art's beauty and interest lies in its complex relations with social institutes and social conventions. The search for spiritual entities as a consensus point behind art and society is, it seems to me, a naive one. Art does not stand above social complexity but rather as part of it and that is what art for life is all about.

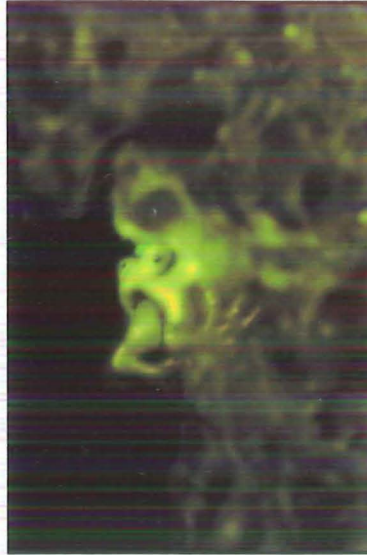
As acknowledged by Lippard and Gablik, Earthwork can be seen as a non-natural art, if examined from the philosophical point of view. After all, Earthwork is a wo/man-made intervention in a natural landscape. Earthwork is a wo/man made construction, which by its definition ceased to be natural. Earthworks are human rituals. If the focal point is the natural materials, from which the construction is made, tissue engineering can be seen as natural and can be employed for ritualistic purposes. If the idea behind Earthwork is the natural materials which are constructed to re-establish our relationship with nature, tissue engineering can be constructed to fulfil this idea just as well. Tissue engineering might be seen as using modern natural materials. However, these natural materials combined with technological and scientifically powerful knowledge, carry more extreme consequences for society, and its relationship with the environment. It means that art dealing with biologically related technologies is the contemporary art for life.

Let us examine a possible future in which tissue engineering plays a role: You have a serious accident. Your leg is cut when you use your lawnmower incorrectly. You do not have to panic, and you do not have to look for the detached limb and bring it quickly with you to the hospital. The development in tissue engineering will enable the doctors to grow you a new leg in vitro conditions and to attach it back to your body (1995, Lager & Vacanty). Furthermore, for a special request (and probably a big amount of money) you will be able to upgrade your body. A third leg? A tail? Nothing is impossible.

The latest controversy in the international swimming competition will not catch the news headlines any more. Drugs for physical enhancement will be perceived as a primitive way of boosting your sport performances. Actually, most of the society will be tuned toward the "freaks"

Olympics (unlike the current “junkies” Olympics). The most complex bodily performances and best results ever, will be shown in this Olympics. In the “freaks” Olympics it is allowed to use your third hand to play Tennis. Furthermore, new sports will be developed to match the new bodies and their enhanced senses and abilities: swimming for athletes with gills, or distance sniffing for athletes with proboscis.

2.1.3 Smithson and Christo:



I would like to return again to specific expressions of art of the sixties and seventies.

Robert Smithson was a leading vanguard artist and thinker in the early sixties and early seventies. His art can be seen as ‘an act of faith in new roles and powers for artists in this ruined world’ (Lippard, cited in Hobbs, 1981, p.31). This is as a result of his attempts to deal with the “ugly” environment, for example swamps and industrial wasteland. In a way, Smithson blurs the boundary between nature and culture by attempting to sculpt the culturally “destroyed” natural environment. This is done in order to comment on our socio-aesthetic vision of what is nature and what is beauty in nature, and to question the extent of human intervention in nature. Smithson questions the social and aesthetic position of industrial wasteland by treating it as a natural landscape and a natural material from which Earthworks are built.

In many ways, the TC&A project, like Smithson, blurs the boundaries between nature and culture by re-questioning social norms of beauty. TC&A artefacts seem to a few people to be monstrous or ugly. TC&A artefacts are also a hybrid of the natural and the human-made. The hybrid entity which blurs boundaries and stands “in between” tends to look, by social norms, as ugly or monstrous, just because of its undefined nature. As noted by Donna J. Haraway in her book *Simians, Cyborgs, and Women: The Reinvention of Nature*, the word **monster** and the word **demonstrate** relate to each other both literally and semeiotically (1991, p. 149-181).

Christo, a French artist of the same era examines another aspect. His works present a different look at the human-made intervention in nature. Christo’s works are often defined as site works which are ‘environmental constructions, frequently made of sculptural materials, designed to interact with, but not permanently alter, the environment’ (Preble, 1989 p.438). For the purpose of this paper, I will refer to his work “Wrapped Coast - one million square feet”, Little

Bay, Sydney, Australia 1969. In this artwork, Christo wrapped the cliff-lined shore at Little Bay, with a synthetic woven fibre. The wrapped area was approximately 2.4 kilometres long, 46 to 244 meters wide, and 26 meters high at the northern cliffs. 'The coast remained wrapped for a period of 10 weeks...then all materials were removed and the site returned to its original condition' (Kaldor, 1990, p.120). According to Elsen, 'Christo's personal moral and artistic imperative seems to be *only connect*: connect people with people...connect the elements of art and nature...connect art and engineering...connect people with beautiful materials and structures...connect people with their past and present' (cited in Kaldor, 1990, p.15). I would like to stress the idea of connecting nature with wo/man-made materials. Christo combined physically as well as symbolically these two entities that in 'some respects the wrapped objects remind us of skin' (Bond, Cited in Kaldor, 1990, p.23). However, the connection of these entities did not yield symbiotic and lasting interaction. The border between the two entities was visually abolished, but physically did not carry any future substance. Furthermore, unlike Kaldor's assertion, Christo's work altered the environment and created a long term ecological disturbance. It means that the interaction of human-made material with the natural landscape was done without a thorough investigation and exploration of the nature of the entities and the way of symbiotically interacting between the two to sustain them together harmoniously.

The TC&A Project attempts, when dealing with the interactions of organic and non-organic entities, to actually learn and acquire scientific knowledge that will deal with the basic units of these entities. Furthermore, TC&A artefacts can exist only under controlled conditions in an incubator, which imitates in vivo conditions.

The TC&A project tries to combine organic and non-organic entities beyond the superficial, to create an actual integration in which the two entities will symbiotically interact together. The idea governing this attempt is to visualise a future in which the use of organic systems may replace and/or seamlessly interact with human-made structures to the extent that our cultural perceptions of what is alive and what is artificial will be redundant.

Ironically, the TC&A project is the "Anti Christo". While Christo wrapped nature with a cultural product, TC&A engages in nature wrapping culture (cells wrapping objects). Christo worked on a very large scale of a vast landscape, while TC&A works on a microscopic scale.

2.2 Post-Human Art of the 80s & 90s

In many ways the Post Human art that began in the eighties came as a reaction to some of the dominant discourses of the art of the sixties and seventies. The art of the eighties celebrated technology and media excess. The visions of Lippard and Gablik of relations to nature, seemed to be too romantic and naive. Post-human art regards nature as obsolete, and examines culture from a human-centric point of view.

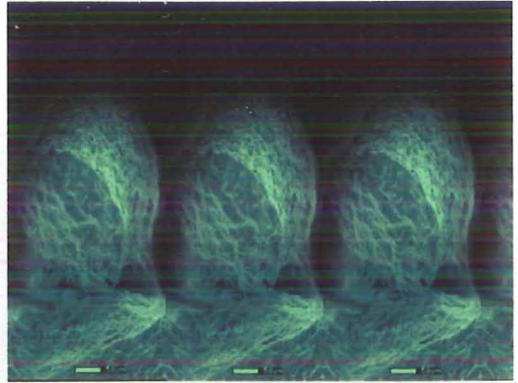
2.2.1 Self Vs Other:

Robert Hughes (1991) describes how in the past nature 'provided the governing metaphors within which almost every relationship of the Self to the Other could be described and examined.' Furthermore, the theme of the natural order was used in some ways to 'correct the pretensions of the self, and gave mode and measure to pre-modern art' (p.324). It seems that in the modern era, the era in which culture dominates nature, nature ceased to be a mode or measure for the pretentious Self. Jeffrey Deitch (1992) in his book on Post-Human art, suggests that the 'modern era might be characterised as a period of the discovery of the Self' (p.33). I suggest that this discovery of the Self is defined and outlined as a separate entity from the Other. While in pre-history, the unexplained nature, which was governed by imaginary deity, was

utilised as the ultimate Other, our time is different. Secular culture, with a progressive capitalist ideology of individualism, and extremely powerful technologies made by humans, forms a different Other. The Self and the Other have no bigger scale to refer to.

The Post-Human agenda acknowledges the fuzziness of nature/culture borders. Furthermore, this fuzziness leads to a new "idol", or a new governing sacramental experience which will create a social transformation. It is not nature as suggested by Gablik, but it is the "I" which is the source for reference and for change.

Modern society with its obsessiveness with human centric individualism, has proved to be unsatisfactory to explain our environment and our position in this environment. On the contrary - humanoids have proved they can disharmoniously live with their environment, and we can see that by looking at the current critical environmental situation, and by looking at the persisting need of humans for better relations with "nature" for their physical and mental well being. As Eleanor Heartney² describes; 'art has travelled through rocky terrain since the utopian visions of early modernism. The triumph of the individual and the shucking off of tradition have proved empty victories as we contemplate the possible ruination of our world (1997, p.21).



The Post-Human art, which still works from the binary construction of the Self and the Other, has a unique twist to it. The Other, according to Post-Human art, is not another individual human being, but rather cultural technology, hence our use of machinery. *The Post-Human manifesto* (1997) as published by Pepperell & the Pipe Collective, tends to go to extreme paranoia and declares: '...we have reached the limits of Human understanding and it is only by cooperating with machines, and eventually being subsumed by them, that the Human species, as we currently know it, can progress towards redundancy' (1997, on-line). However, Pepperell raises an important point, in which human relations with their environment are interdependent with their human-made tools (which is another way to give a general description of technologies). Our understanding of the world is mediated by our glasses, by the television, as well as by microscopes, in which 'magnified images of our cells shows us that we are walking communities of microbes - communities of "others" that paradoxically constitute not only the human entity or Self but all other living entities' (Cleland, 1995, on-line). Pepperell's declaration of the human species being redundant by their machines seems to be too simplistic, and resembles many science fiction movies such as *The Terminator*.

In general, Post-Human art maps traditional social dichotomies in a new way. The dichotomy of nature (organic, animate, subject) versus culture (non-organic, inanimate object) is blurred. The human animate organic subject is incorporated with the cultural inanimate machinery into one entity.

Post Human art also engages us with the effects of medical technologies and telecommunications technologies and their effects on us. The focal point, in Post-Human manifestos is the

²Eleanor Heartney is an independent art critic. She publishes in art publications such as *Art in America* and *The New Art Examiner*.

individual, human body - and the Human Self in its post-modern look. For example, the gendered Self is in a "liquid" shape that can be formed and changed. Furthermore, the body, the physical source of the Self, can be formed and changed just as well.

2.2.2 Orlan and Sterlac:

Orlan, a French artist, employs technology of plastic surgeries as a medium to articulate self-transformation. She performs medical surgeries on her own body, designing her body according to beauty myths such as the Mona Lisa's bone structure as well as attempting to grow the biggest nose possible in relation to the composition of her face structure. She declares, 'This is my body...This is my software...' (cited in McCorquodale, 1996 p.4). Besides using her own body, she utilises photography, video, medical technology, theatre and mass communication via networks to experiment with physical changes in identity and to critique traditional notions of beauty and prevailing Western concepts of femininity and identity. Her plastic surgery is broadcast live around the world using the internet and satellites. The actual surgery room adopts ritualistic functions, from specifically designed uniforms for the medical staff, to a planned set design of the interior of the surgery room. Orlan reads poetry and other self-written material while being operated on.

She believes that her own planned body design is an 'assertion of the supremacy of the individual's designing will over the late capitalist image factory' (Cited in Goodall, 1996). Unlike Michael Jackson, who can be seen as a victim of our capitalist image factory, she embraces advancement in computer and medical technology in order to confront us and raise serious questions 'concerning identity, taboos against opening the body, myths of femininity, private and public domains' (McCorquodale, 1996, p.4).

Sterlac, an Australian based artist, can be seen as someone who pushes the integration of the body/nature - machine/culture to its extreme. In his performance, *Amplified Body, Laser Eyes and Third hand*, Sterlac's body movements were controlled and choreographed via the Internet. A person using computer software could activate special commands, that in turn sent specific electric waves to wires which were attached to certain muscles in Sterlac's body. This created involuntary muscle movements which Sterlac presented as a performance. Special amplifiers could recall and enhance Sterlac's internal body sounds, and a mechanic third hand attached to Sterlac's right hand, was incorporated in this performance, manifesting its own involuntary movements. Sterlac refers to the ideas behind his work by saying the

only evolutionary strategy I see is triggering an evolutionary dialectic, to incorporate technology into the body...technology, symbiotically attached and implanted into the body creates a new evolutionary synthesis, creates a new human hybrid - the organic and synthetic coming together to create a new sort of evolutionary energy (1996, on-line).

As opposed to Lippard and Gablik, Sterlac's way of incorporating nature and culture, and re-establishing some coherent relationships, is orientated towards a futuristic scenario, or a post-evolutionary realm in which culture (machinery) will work symbiotically with nature (body). Sterlac recoils from 'the re-emergence of the mystical' in the guise of a return to 'cultural rituals that have long outlived their purposes' (Dery, 1996, p.159). He prefers to explore futuristic scenarios and possibilities, which are already emerging in the present (Such as the "cyborg grandmother" of the author of this thesis who had common hip replacement surgery a year ago. She is currently carrying in her body non-organic machinery in the shape and function of her original broken bone). Sterlac looks at this future, in a playful attitude, as a vast open future, waiting for us to form and shape. Sterlac maintains that 'technology provides each person with the potential to progress' (cited Dery, p.61).

Whether this progress is for better or worse depends on the ways the scientific knowledge and its related technologies will be utilised, by whom they will be utilised, for whom and for what purposes. However, time goes in a future direction, which will be different, as we will be different, and we will think differently.

Medical surgeries can save human lives. Cosmetic surgeries can change human form, not as a life saving activity but either as restoring monsters to "normal" (treatment of acute burns accidents, birth defects and more) or as creating monsters. This is done as an artistic exploration (Orlan) or as a fulfillment of social-cultural fed or victimisation (Michael Jackson).

However, there is also another side to these technologies. For example, let us examine a devastating disease such as breast cancer. There is a new solution for women who lose a breast as a result of breast cancer: A new method utilising tissue engineering techniques is developed in which a woman's breast cells grow on a "scaffolding" of biodegradable plastic, which gives the tissue the desired shape and dissolves after growth. This process is completed over several weeks. 'Built from a woman's own cells, the resulting implant tissue wouldn't face the rejection issues seen in transplant surgeries' (Cited in Wired News, 1997, on-line)

Post-Human art in many ways attempts to blur the boundaries between culture and nature through the theme of the Self and by looking at current and futuristic development in technology and science. In a way, Post-Human art, or the 'technological human' reconceptualises 'the human body as a boundary figure belonging simultaneously to at least two previously systems of meaning - 'the organic/natural' and 'the technological/cultural'.' (Balsamo, 1994, p.215).

2.3 Tissue Culture as Art

The attempt of Earthworks and Environmental art to re-establish a connection with a traditional way of life, in order to give the individual some communal frame of living and communal values and ethics, led "back" to nature. In the art of the sixties and seventies nature was generally seen as an entity opposing human culture. Furthermore, humans' domination of nature and human cultural and technological progress tended to be seen as the source of the problem, and therefore there were voices against cultural development by reflecting on supposedly more spiritual and harmonious times between humans and their environment in pre-history. Post-Human art is characterised by post modern cynicism towards the romanticism of the past, and post modern cynicism towards communal effort and responsibility. Post-Human art followed an individualistic ideology, exploring the interaction of the individual body with its cultural environment. The Post-Human manifesto's author, Deitch, acknowledged the fact that recent developments in biologically related technologies will force human society to redefine fundamental issues such as what is life and what is human: '...we will soon be forced by technological advances to develop a new morality...In the future, artists may no longer be involved in just redefining art. In the post-human future artists may also be involved in redefining life' (Deitch, 1992, p.47). However, Deitch maintains his individual-human-centric perspective when looking at these issues. "Life", according to him, is the life of the individual human, and not the life of the humans' environment, its organisms and lives (plants and such), and the communal existence of all of them together.

TC&A looks at blurring the boundaries of nature and culture outside the realm of the organism's body (in vitro conditions) and at shifting the focal point from the Self, to a larger frame work of social existence and the environment.

2.3.1 What is life?

During our experiments in growing tissues on glass figurines, we used cells from a rabbit cornea. I would like to stress the fact that the rabbit was not killed by us, but rather it was killed a day before, for the purpose of gourmet food. (I was amazed to find out that the cells in the rabbit's eyes cease to live only a couple of days after the death of the rabbit). After removing the sheet of cells needed from the rabbit's eyes, under sterile conditions, we put the cells in a Petri dish and filled it with media containing certain chemicals that kill bacteria and sustain cell life. We kept the cells in a fridge for the night. The following day we attached the cells to the glass (which was sterilised beforehand) and put them in tissue flasks containing nutritious media. The flasks were kept in a special incubator containing a specific level of carbon dioxide at 37 degrees. Approximately each couple of days the cells had to be fed and they grew in a matter of a few days.

By culturing these specific cells, theoretically they can be maintained alive (through the processes of primary culture -> sub culture -> cell lines³) forever. That means that in a way we extended the life of some parts of the rabbit. Therefore we can ask the question, if some of an organism's cells live, is the organism dead?! Furthermore, tissue culturing can prevent further animal killing, by experimenting on the tissues, rather than on organisms. (Cells and Tissue Culture Techniques A Combination of Science and Art, on-line). What I am trying to show is that tissue culturing (and the TC&A project) is not concerned with killing animals for the purpose of research, but rather emphasises the option of preventing further animal killing.

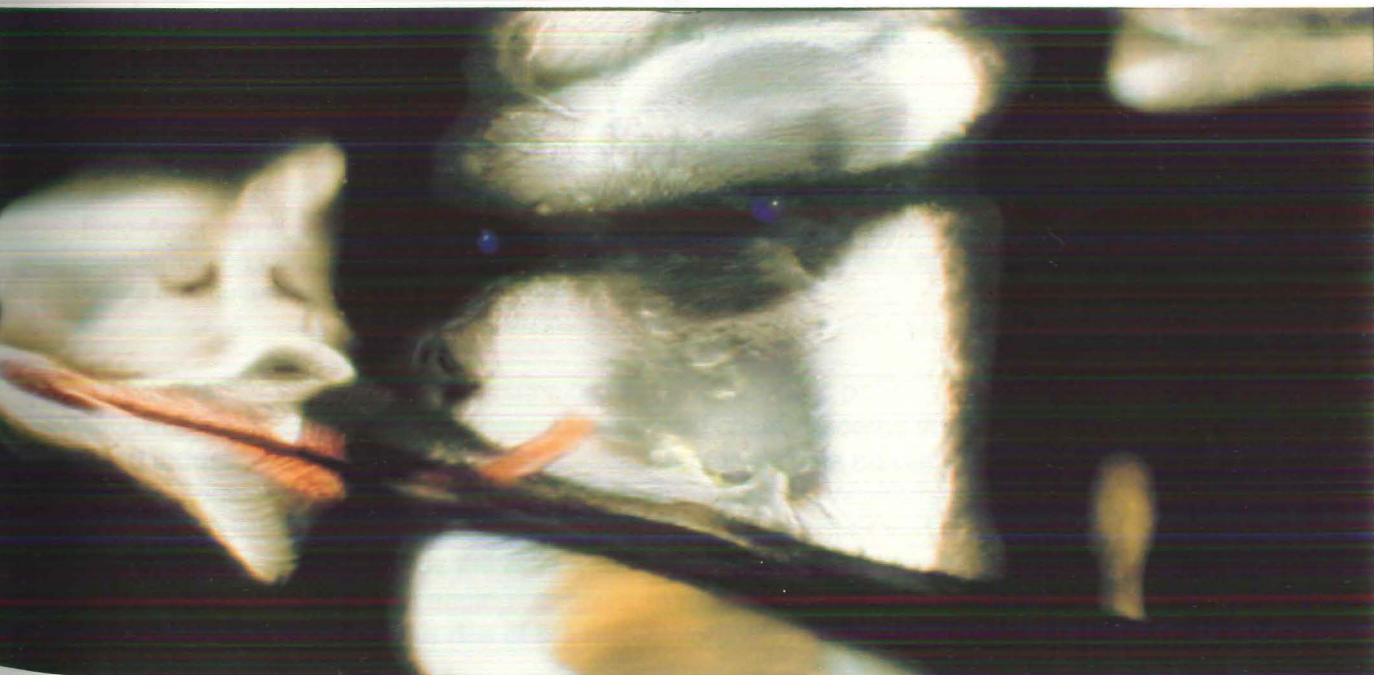
TC&A attempts to look at tissue engineering as an art form. This is done not as part of scientific or medical research but, as Goodall (1996) says, as 'experiment as play'. This play, may lead to an extremely important conversation and debate about how the new millennium will be affected by the biological revolution. TC&A as art expression questions social and philosophical conventions in the light of new boundaries. It follows the idea that the 'most valuable art today may be that which operates not as a declarative, but as an open-ended, thought provoking question mark' (Heartney, 1997, p.62).

By play I mean that the TC&A project is a process and experiment for the sake of raising questions and debate (and no harm) and not for the sake of economic gain. Furthermore, a play which must accompany enthusiasm, curiosity and an exploration of new angles, a play with no competition or immediate materialistic goal, but rather a way of interaction and communication accompanied with sense of fun and learning about this interaction through its actual process.

With my involvement in TC&A artistic work, which is rather an open-ended process, I found myself questioning my own conceptual map, which I considered to be a relatively stable outlined map, and found that it is "outdated" in relation to an already significant change drawn from my acquired knowledge of bio-engineering. My idea of the essence of life, of consciousness, and the difference between humans (and myself) and other forms of life is not as clear as it used to be. Furthermore, the microscopic world exposed to me might seem small to the bare eye, but is a whole new world and a vast landscape to the eye, attached to and aided by medical imaging machinery. This microscopic world is not only beautiful and exciting with options for new forms shapes and colours, it is also a world which presents to me the close relationship between all organic lives.

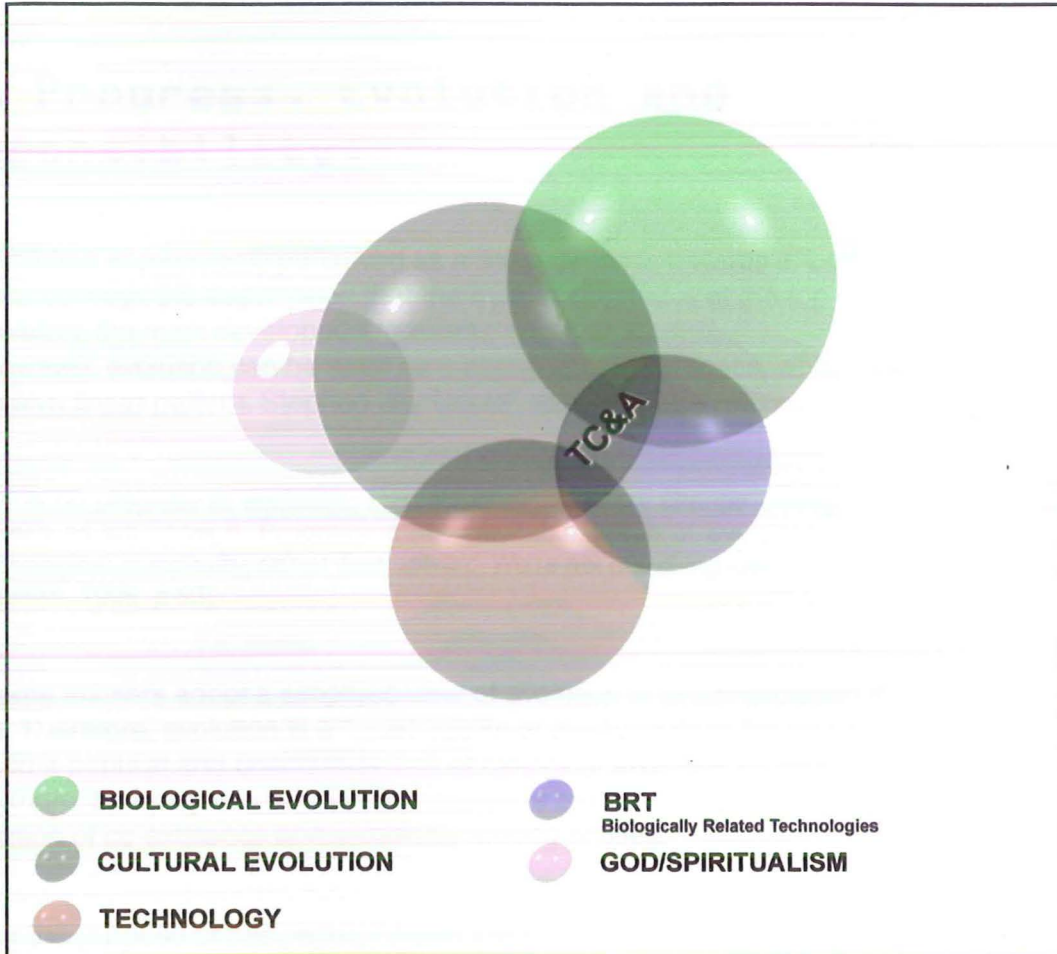
³This is not the place to detail the specific processes of tissue culturing, primary tissue and cell lines. The information can be obtained in Chapman & Hall or Landes Bioscience books offered in the Bibliography.

The destabilisation of my inner map, raises the joy of discovering optional new terrains and interrelations among entities, as well as a fear of the consequences of such “freedom” in a capitalist, economic driven society, with unequal power relations. This is one of the reasons for my engagement with the TC&A project. TC&A aims to stimulate the wider community to sense this phenomenon, to think and to express their own voice in regard to the future of humans and their organic and non-organic environment.



CHAPTER TWO

3.0 ECOLOGICAL ISSUES



Euro-American civilisation, the dominant culture in recent history, has invented many living natures, each formation mirroring, to some extent, the science of the day and the heterogeneity of religious beliefs and cultures (Soulel, 1995, p.138).

This chapter will attempt to explore current and futuristic natures in our techno-scientific society, in relation to the current physical ecological crisis. It seems that after modernism, which glorified industrial progress, and in the realisation of its effects on our environment, scientific and technological progress, has been used, in the dominant Western discourse, as a synonym, for ecological distraction. This phenomenon arises from a rooted traditional Western cultural dichotomy of the natural versus the human-made, or artificial (as illustrated in Chapter One). This chapter will examine the ecological crisis, in relation to scientific and technological progress, in the context of 'the rise of the neo-biological civilisation' (Kelly, 1994, p. 1-6)¹.

¹ Kevin Kelly, the executive editor of *Wired*, refers to the dawn of the new era in which the adaptability and autonomy of living organisms becomes the model for human-made systems and machines.

The first part of the chapter will question the lay person's understanding of the meanings of evolution and cultural progress. The second part will examine these beliefs in a wider social context. The third part will illustrate possible futures for 'artificial ecology'², in which technological and scientific progress are accompanied by social responsibility toward a sustainable and harmonious organic and non-organic environment. The TC&A Project will be presented as a tangible and conceptual expression of the issues discussed, and as a linking point between biological and cultural evolutions through the theme of biologically related technologies.

3.1 Progress, Evolution and Responsibility:

Evolution is commonly perceived as a linear process towards a "better" developed species. This idea conveys the assumption that the human species is at the top of evolutionary progress, and therefore the most developed organism.

However, evolution can be seen as a non-purposive process, which does not follow a progressive linear pattern. Stephen Jay Gould³ asserts:

There is no progress in evolution. The fact of evolutionary change through time doesn't represent progress as we know it. Progress is not inevitable. Much of evolution is downward in terms of morphological complexity, rather than upward. We're not marching toward some greater thing (cited in Brockman, 1995, p.52).

Some thinkers adopt a simplistic view of evolution in which evolution is based on competing entities. Therefore, evolution is a "cruel" reality of the survival of the fittest. This perception is based on a populist and unaccurate look at biological evolution as evolving toward a purpose. Furthermore it propagates the idea that nature is based mainly on a power struggle and the devaluation of co-existence and symbiosis among entities.

For the purpose of this paper, I would like to employ Hall's (1992) graphic metaphor and divide evolution into two categories: biological evolution and cultural evolution. Biological evolution is a non-purposive and a non-linear one. It changes very slowly and is built on accidental or consequential change rather than a motivated one. Cultural evolution can be perceived, from a human perspective, as a purposive one (and one which changes at an extremely high speed in comparison with biological evolution). Cultural evolution can be shaped to a large extent by humans. Again, cultural evolution is a very complex system, drawing on linear patterns as well as chaotic and cyclical ones. To predict the outcomes of cultural evolution might seem similar to predicting the weather or long term economics as it has too many interconnected variants which are hard to predict. However, it is very important to stress the purposive notion of cultural evolution, which can be analysed and shaped with a communal and global effort. As Dr. John Pickering writes in an article about artificial life:

For human beings, cultural evolution has outpaced biological evolution for over a million years. The environment in which people develop is now largely artefactual. The vistas, objects and opportunities for action encountered by people, especially those living in technocracies, are almost totally shaped by the actions of other people (1996, p.107).

² A term coined by Ezio Manzini. The idea will be illustrated in a later stage of this chapter.

³ Stephen Jay Gould is a professor of Zoology, Geology and the History of Science at Harvard University. He has published many books concerned with the study of Evolution.

Humans' position in their environment has changed dramatically through the progress of cultural evolution. Looking at the idea of a non-linear and non-purposive biological evolution, the human's position is not on the top of its environment, but rather an integral and dependent part of it. However, purposive cultural evolution (which is dependent on human's cultural progress), puts humans as the dominant force controlling its environment, and changing its course toward some purposes.

In the light of Pickering, who stresses the idea that cultural evolution has outpaced the biological one, and is the source of shaping and changing the environment, I would argue that the human species, with its acquired knowledge of nature and natural processes, should have some responsibility for its own (and others') environment.

The TC&A Project presents a way of reconciliation between the conceptual ideas of biological evolution and the reality created by the dominance of cultural evolution. It expresses the idea that biological and cultural evolutions are both important for our survival. Biological evolution might be slow, but its non-purposive mechanism and, to a certain degree its pace, is the source of its strength. Biological evolution "treats" all organisms and their environment as equal (in other words it is indifferent to all organisms and the environment). Current modern reality, however, is dominated by human cultural evolution. Cultural evolution is human centric, human motivated, and therefore carries humans' achievements as well as humans' stupidities. This idea is becoming even more extreme with the acquired knowledge of biology and its related technologies.

The border between biological and cultural evolution is being questioned in the light of humans' knowledge of the control of biological mechanisms. Tissue culturing and tissue engineering techniques are not only a characteristic of the progress of cultural evolution. They are also a sign of the abolition of the difference between biological and cultural evolution. Today, they tend to become one entity.

TC&A explores the relations between human made objects (cultural evolution) and natural processes of cell growth (biological evolution) as one entity which is evolving. This evolution depends on the biological laws of the cells and their interaction with different human made materials as well as the artist's treatment of these cells. Artists can manipulate, direct and divert this semi-living entity according to their aesthetic and conceptual ideas and beliefs. The manipulation can be from the realm of the cell's DNA, the physical conditions of the environment, to the design of the human made object and the visual representation of TC&A artefacts.

3.2 The Ecology:

Colin Tudge (1993) attempts to blur the boundary between nature and culture defining the term ecology without constructing it in relation to its supposed binary opposite:

The word 'ecology' was derived in the nineteenth century from the Greek *oikos*, meaning household; the same root as in 'economy'. It is the study of how living things interact with their physical environment and with each other. In many people's minds 'ecology' is equated with a particular romantic movement: like 'Green', some feel it to have mystical and even anti-scientific overtones (Tudge, 1993, p. 354).

Tudge's attempt to locate the sources for this popular binary construction is illustrated in the next section of the paper which deals with a wider social context.

It is important to stress again humans' need of an organic environment. By organic environment, I mean, an environment consisting of the biodiversity of organic matters and

organisms. Victor Papanek (1995) believes that highly artificial environments result in a 'damage to the performance of our sense and brain-body system' (Papanek, 1995, p.76-77). The TC&A agenda maintains that humans, like any other organism, depend on an exposure of their senses to organic stimuli for their physical and mental well being. This theme was emphasised and explored in a previous chapter when looking at the art of the sixties and seventies.

Furthermore, biodiversity is important not only for aesthetic or moral reasons, but also as a treasured source of biological knowledge and resources for our own survival. Humans' ability to learn about themselves by looking at other organisms, different organisms, including us and our own personal unique genome is a source for medical applications. The economic benefit of biological materials (either for medical, agriculture or cosmetic purposes) is already known. In 1980, the USA formally agreed that 'Biological material is patentable if obtained by an essentially nonbiological process.' This looks like a contradiction in terms. However, a "nonbiological process" has been defined as one in which the "hand of man" has had a part (Hassler, 1996, p.290).

In the light of the 'Neo-Biological Civilisation' (Kelly, 1995), when biotechnology and bioengineering are developing rapidly, the importance of biodiversity is further revealed. The enormous potential power of these technologies in shaping our evolution, is stressing the need to examine them in a wider social context. The TC&A project attempts to raise a debate, not from a scientific point of view, but rather from a hybrid angle of the art/science and social aspects of these important issues.

Bill McKibben's (1989) understanding of humans' need of "nature" results in a call for preventing scientific and technological progress. He perceives biotechnology as a dangerous "tool" for humans' use because of what he perceives as human nature: 'We have worked from the outside in to alter our environment. Now we are starting to work from the inside out, [using biotechnology and bioengineering technologies] and that changes everything. Everything except the driving force, the endless desire to master our planet' (p.148). Oron Catts (1996) comments on McKibben's writing, that McKibben 'raises a problem that can be seen as mainly aesthetical, or can be seen as theological' (p.23). Catts claims that McKibben's wish for a nature untouched by human civilisation and the 'restoration of nature to the state it was before human civilisation is his (and other environmentalist's) holy grail.' Catts puts the emphasis not on the technologies but rather on its relation to the economic system, hence capitalism. He calls for the re-evaluation of the economic system rather than the issue of stopping progress.

Those who oppose progress sometimes do so from the fear of the unknown or from the fear that the progress may harm their belief system. Biotechnology can be seen as one of the most problematic new technologies because it links technological progress with the core of living, and it affects the belief in the natural superiority of humans, and in an unnatural force that gives life. However, biotechnology can assist in creating a new model of sustainable progress by the integration of human technologies with natural processes, in order to create sustainable ecology, hence, a better future (Catts, 1996, p.45).

This paper is written from the assumption that human nature is not bad, but rather characterised by the inspiration to increase knowledge and understanding of the environment. This human curiosity, accompanied by technology, cannot be undone, but should rather be carefully utilised for a better future.

The TC&A Project explores this imagined future by creating art objects and art expressions, questioning the relation between what is socially considered to be natural and what is not natural. TC&A also explores the interdependent relation between biological and cultural evolutions. This is done in order to create a context for further questioning and examining our future in which evolution becomes more and more under human control.

Tudge (1993) maintains that there are three main problems affecting current relationships between ecology and scientific and technological progress (pp 254 - 286):

3.2.1 We do not know what we want.

As a society we do not have a united clear vision of the future we want to create (if we hypothetically had all the means to create it). Do we want to regress to pre-historical time, to what we perceive as harmonious relations with nature? After all, we progress to learn more, to control and protect us from the wild and dangerous nature. Bucktman (1996) maintains: 'I think there's been a long standing dream of rediscovering paradise. So what if we have urban space which has sort of separated us from nature, then our dream of technology will be about technology giving us pristine natural environment again within the city' (Synthetic Pleasures, Script, www, 1996). By that we will accomplish "paradise" in which wilderness will be controlled and formed to humans' purposes. However, if this scenario was possible - though it seems that the natural environment is too complex for humanity to fully understand and control - then we would lose the thrill of succumbing to forces bigger than us. We will lose the thrill of losing control, and the adrenalins aroused in us by danger and the unknown. That means that the call for a better future is rather abstract. By saying better future we neglect other essential questions: better future for whom? What is this paradise we wish for? Is this hypothetical paradise a part of humans' dissatisfaction trait (the one that actually encourages us to learn more and explore further)?

3.2.2. Social attitude:

'Everything in modern societies is now honed by the agriculture attitude of exploration and exploitativeness...People in most industrial societies take it as read that the specific role of industry is to create wealth; that the specific role of technology is to serve industry; and that the specific role of science is to create new and more 'competitive' technologies' (Tudge, 1993, p.383). Social attitude, again, is a complex system. In our current capitalist society, there is an emphasis on individual profit gain, rather than a communal plan for the well-being of the wider population in the long run. When science and technology are involved in such a social system, they "adapt" to a certain extent for the purpose of profit gain. However, science and technology are means that can be utilised and incorporated in saving the ecology and helping the disadvantaged. For example the scientists who cloned Dolly have now produced Molly and Polly (even the names of the sheep are not fully original but rather a clone of the cloned...). Molly and Polly are 'two lambs cloned with human genes so their milk will contain a blood-clotting protein that can be extracted for use in treating human haemophilia' (The Weekend Australian, December 20-21, 1997, p.17). Molly and Polly are healthy sheep which can help the sufferings of human beings.

3.2.3 Ignorance about science as stated by Tudge(1993):

3.2.3.1 The wider community treats science with fear and is superstitious as a result of not knowing what it means and how it works.

3.2.3.2 Science is conceived not only as a tool of thought and knowledge, but rather as an active participant in capitalist society which carries an industrial agenda.

3.2.3.3 Science is not exclusive to scientists only. It is not beyond a lay person's understanding. More importantly, science should be shared by the wide community, and decisions concerning its applications should be decided by the community. However, sharing, understanding and enjoying science has to come from the effort from both "camps", the scientists and the community. Furthermore, natural sciences are a discourse "exposed" by the complexit of other sciences such as social sciences, physics, philosophy, art and more, as well as social movements and historical context.

Science and technology can also be utilised for education and art, as in the case of TC&A.

TC&A hopes to encourage the wide community to explore and enjoy science through art. It also encourages people to ask questions and make their voice heard via a specialised site on the Internet. TC&A is a non profitable project, does not give answers about the way science should be incorporated in society's institutions, but rather stimulates discussion in relation to these issues.

Kelly (1994) maintains that 'nature has all along yielded her flesh to humans.' However, as a result of revolutionary development in biotechnology, 'now, Bios is yielding us her mind - we are taking her logic' (p.2). This idea has enormous consequences for humans and their environment. In many ways, humans' increasing knowledge of the core of living must be enwrapped together with humans' creation of corresponding values and ethics. Ethics that will enable us to maintain symbiotic relationships between nature and culture, for the survival of both. Kelly (1994) believes that 'the world of the made will soon be like the world of the born: autonomous, adaptable, and creative but, consequently, out of our control' (p.5). Hence, human dominance over nature will be reduced by human creation of intelligent machines, and intelligent non-human entities. Kelly sees this concept as a key for freedom and as an option for unpredictable human and non-human evolution. What Kelly seems to neglect is the downside of losing control. Losing control can be synonymous for not taking social responsibility. Development in biologically related technologies is created by humans. They can be shaped and formed (to a certain extent) by humans, and this is what cultural evolution is all about. Cultural evolution (unlike the biological one) can be shaped to preserve a humanistic, equal and diverse world. This might seem an idealistic vision, but this idealism can be referred to when mapping society values and ethics in relation to current biologically related technologies. In the words of Oscar Wilde 'a map of the world that does not include Utopia is not worth even glancing at' (cited in Hall, 1992, p.402).

As opposed to Kelly, the GAIA hypothesis⁴ offers an alternative way of looking at the neo biological civilisation. According to GAIA, humans are not the centre of the planet but rather an integral part of it. Furthermore, for the survival of the whole organism (in the GAIA case - the whole planet) one has to stress the mechanisms of symbiosis and co-operation. The GAIA hypothesis might seem to reflect Lippard and Gablik's aspiration to re-connect Western society with nature. Furthermore, the GAIA vision of our planet conflicts with the notion of the Self/ Other, as illustrated in Chapter One, and with the Western ethnocentric, humancentric and individualistic society as manifested by Kelly. According to GAIA there is no Other because every thing on this planet is a part of one entity.

Gablik quotes Christopher Manes's GAIA vision as it should be expressed by artists:

As for art...we move it out of the exclusively human world so that insects, mountain lions and trees can also have a voice. This would help to reinstate the sense of ourselves as members of a species within a complex ecology that includes all the world's flora and fauna, which have their own right to exist...artists need to recognise their own place within the eco system (Cited in Gablik, 1995, p.87).

The TC&A project is taking its artistic expression even further. It combines the basic unit of life, the cell, which is common to all life forms, and creates artefacts which/who cannot but remind us of our basic connection with our environment.

⁴ - *The GAIA hypothesis suggests the earth can be seen as one organism. That means that all life on earth, including the oceans, landscapes etc- all of it - is combined into 'what amounts to a single organism with a profound ability to organise for its survival.'* (North, p.189)

3.3. Future possibilities:

The revolutionary nature of the concept of ecological sustainability lies in its reversal of a perceived human right over the last ten millennia, since the start of the agriculture revolution, to dominate nature...The Bioethics Revolution, therefore, requires the essentially seamless integration of human technologies with natural global processes (Broadbent - School of Design UTS, 1994, p.2-3).

Drawn from Broadbent's assertion, the way of dealing with the current ecological crisis depends on seamlessly integrating culture with nature. In other words, integrating the binaries of culture/human-made artificial technology with nature/natural processes.

The TC&A project is an artistic expression which deals also with aesthetic issues. TC&A presents a radical thinking in regard to the artificial environment and its aesthetics. Writings referring to an aesthetic view of biological technologies can be found mainly in scientific papers (however, they discuss aesthetics with the scientific community) or in the writings about Cyberculture (however, the focal point is still digital technologies imitating biological processes). The other angle on this issue is offered by the design perspective of Ezio Manzini⁶. Manzini offers an aesthetic view of product design accompanied by the designer being responsible for shifting social views in regard to the environmental crisis. 'My thesis is that the environmental problematic can generate a new sensuous horizon for design and can be the source of a vast series of cultural transformations and contemporary societal practices' (1992, p.5).

Manzini's writings will be used as a contextual base for a freer look at the same ideas from an artistic point of view. When I say artistic expression, I mean an expression accompanied by the artist's responsibility for the ideas he/she conveys. However, the expression can (and should) be accompanied with a push to some extremes, with the freer notion of art as play, and art as aesthetic expression stimulating further use of one's imagination and one's boundaries of thought and feelings.

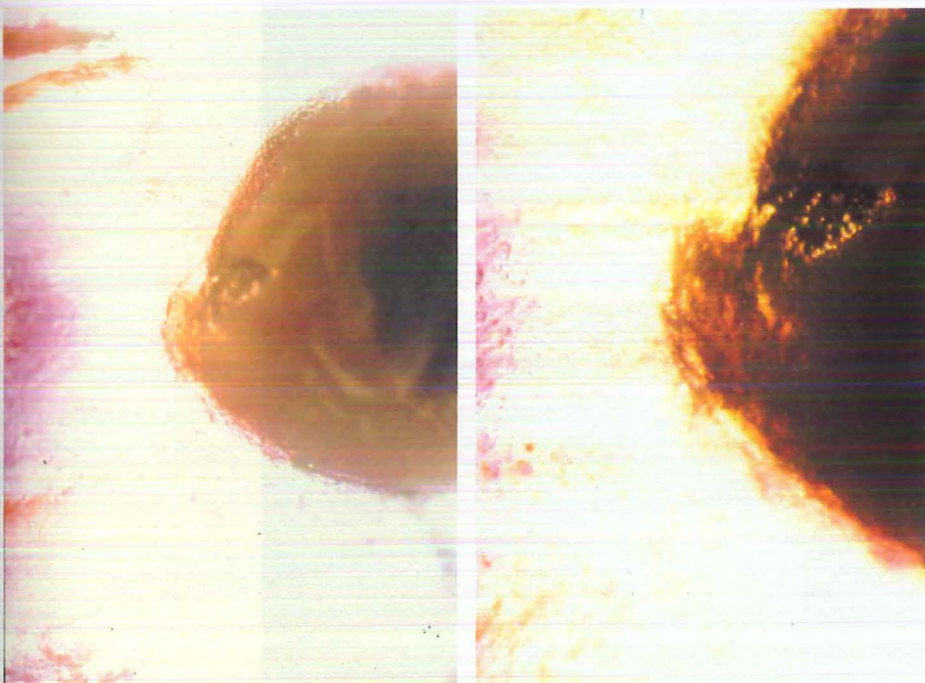
Manzini's base hypothesis is to 'apply to the artificial environment the interpretive models that ecology has developed for the natural environment' (p.12). "The ecology of artificial" according to Manzini 'refers to a mode of reading contemporary artificiality as a stream of material and immaterial artefacts...that relates and competes with each other within a limited environment.' (p.12) When creating an artificial ecology combining natural and artificial materials and processes one has to remember that this is done within the realm of a cultural evolution, by some of the rules of biological evolution, and therefore, must be accompanied by a social framework and responsibility as well as scientific knowledge. This does not mean that artificial environment should be suppressed, but on the contrary, we should aspire to create an artificial environment which will emphasise the advantages of the natural and suppress its hazards. Again, this is not a simple and clear agenda, but rather a base for a social discussion and social responsibility. The TC&A project artefacts are not directed at mass production or mass consumption, but are rather experimental artefacts which/who are intended to be visually and conceptually stimulating and thought provoking.

⁶Ezio Manzini is the director of *Dumus Academy* in Milan, Italy. Manzini sees design as a profession which is currently in a process of transition: 'The subject of design is not the quality of products, but the redefinition of the very concept of product, production and consumption.' (cited in Catts, 1996, p.3).

A society that lives within its limits, then, needs a culture that proposes models of quality that are compatible with given limitations, a culture in which the theme of quantity is integrated with that of quality, and the criterion of beauty includes respect for the environment....Making this "visible", producing new scenarios for quality, can be a specific task for designers. In my opinion, it is really their most specific task...designers have an important role in as far as they are - or can be - culturally equipped to gather, interpret, and propose, in a clearer and more stimulating form "into the circle" ideas that are produced in society and re-admit them (Manzini, 1992, p.18-19).

Manzini's radical proposal is based on looking at objects in a different way, 'not as instruments for our use, but as entities that are effectively linked and that need care - to think of objects as plants in our garden' (p.20). Manzini believes that this radical way of looking at objects 'implies an inversion of the relationship between subjects and objects. It implies a purposive consciousness that profoundly redefines the sense of its goal. It implies a new ecological sensibility - caring for objects can be a way of caring for that larger object that is our planet' (p. 20). Furthermore, in Manzini's utopic world, the closer relationships between humans and their objects will result in reduced waste. The special relationships with the objects will stimulate a sense of responsibility in caring for objects and maintaining their life cycle. TC&A artefacts can be seen as a biological version of Manzini's vision. They require care and attention similar to someone's pet or plant, rather than the "consume and discard" treatment of objects.

Think of objects that are beautiful and useful as trees in your own garden, objects that endure and have lives of their own, objects that perform services and require care...I am thinking of criteria for quality that lead to a system of objects that have the variety, complexity, life, and blend of beauty and utility of a garden but, at the same time, are a product of the real world, a world extensively and intensively artificial (Manzini, 1992, p.20).



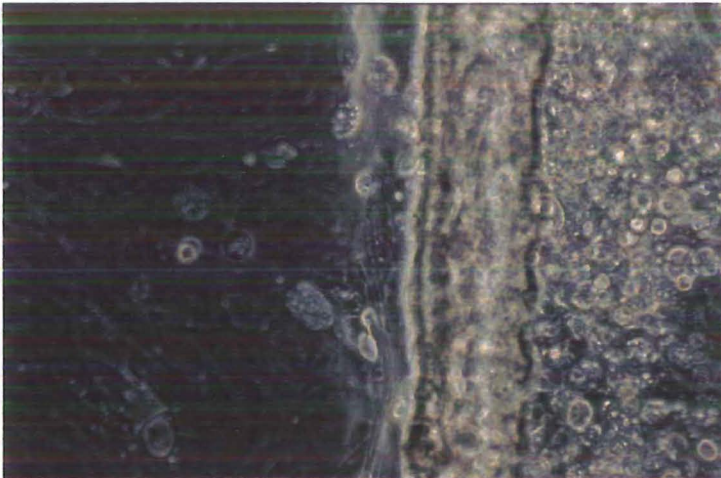
TC&A artefacts are an artistic expression which aspire to be unspoiled by political and economic systems. The project attempts in the presenting of artefacts to show that thought, treatment and visual attention are put into them.

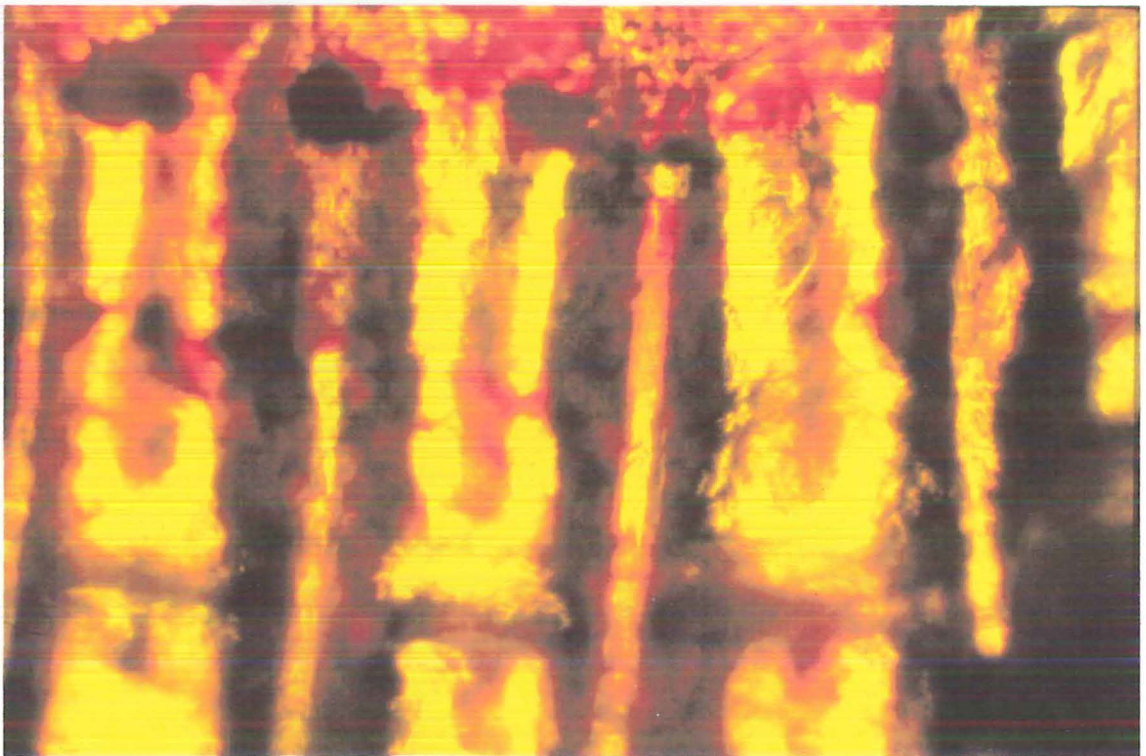
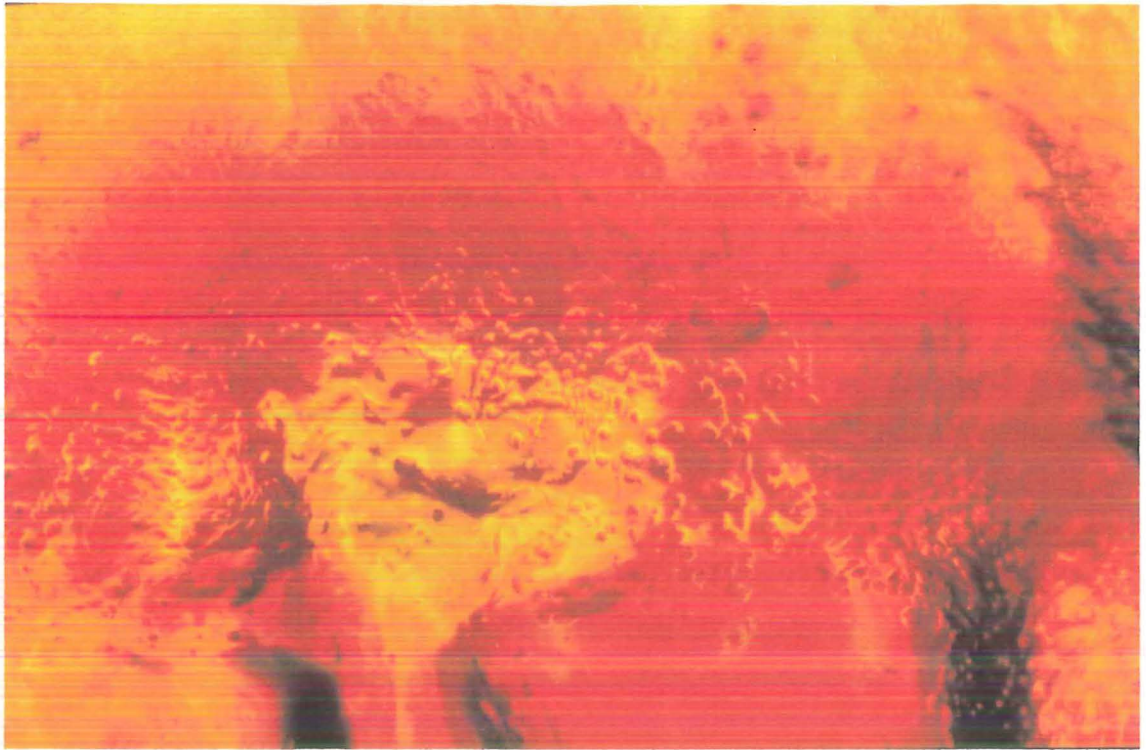
Maybe in the future this art will become more of a norm and will generate Manzini's ideas concerning caring for a limited environment with less consumption and new ideas in relation to the new forms, colours and shapes tissue culturing can generate.

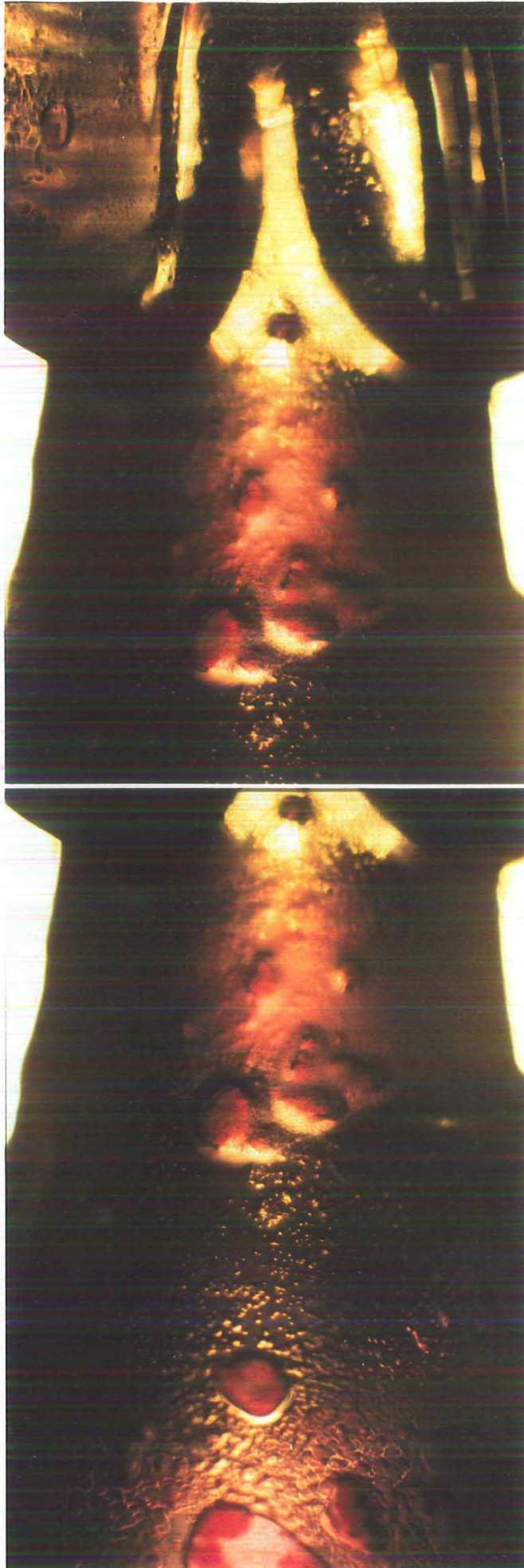
3.4 The TC&A Project and Ecology

There is no doubt that current times are characterised by the ecological crisis. There is an extreme need to define the ecological problem and construct a communal frame-work to deal with the problem. As illustrated in this chapter, in order to prepare an agenda for dealing with the environmental crisis, some of the traditional views in current society should be re-examined. The fear and ignorance of science and biotechnology should be dealt with. More accessible information for the wider society, and more understanding in relation to these technologies will open up a new uncharted map, a map concerned with what is natural, what is artificial, what is animate and what is inanimate. These boundaries should be re-negotiated and shaped and adapted to current human knowledge.

In this chapter I suggested that a way of maintaining a sustainable ecology should be a concern of a wide range of social disciplines. This paper examines the aesthetic and artistic angle, as an important tool in reshaping social assumptions and attitudes. TC&A offers a different view of rooted binary constructions, and the notions of beauty. It puts a greater emphasis on the symbiosis and cooperation of organic and non-organic entities, and the possible positive aspects of an artificial ecology. This is done with social and ecological awareness.

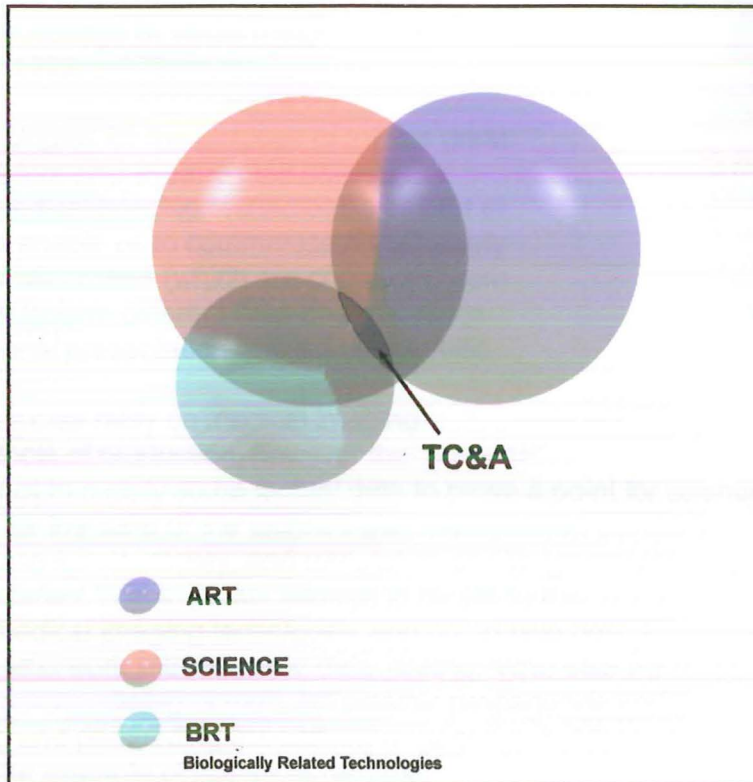






CHAPTER THREE:

4.0 VISUAL ISSUES



Modern visualisation technology is predicated on the fact that half of our neurological machinery is devoted to vision (Stafford, 1993, p.474).

More than half the human cortex is involved in vision, and much of vision and perception is built upon the ability to distinguish borders and outlines (Hall, 1992, p.15).

Chapter One explored how TC&A artefacts blur the boundaries between nature/culture and The Self /The Other through art discourses. Chapter Two examined the further collapse of these meta-dichotomies by looking at biological evolution and the natural in relation to the cultural evolution and the artificial. This chapter will examine in more detail the blur of these dichotomies by referring to specific visual expressions of the TC&A Project.

Firstly, I will explore TC&A visuals in relation to science and art in the light of Barbara Stafford's¹ (1993) assertion that 'this timely shift toward organic cooperation among the representing arts and the experimental sciences will have a salutary impact on the interpretations of experience as a whole' (p.471). Secondly, I will explore further the dichotomy between the organic and non-organic elements of the TC&A project by examining the colours, shapes and technological methods of TC&A visuals. I will conclude with the TC&A agenda that biologically related technologies can and should re-establish human relations with their organic environment.

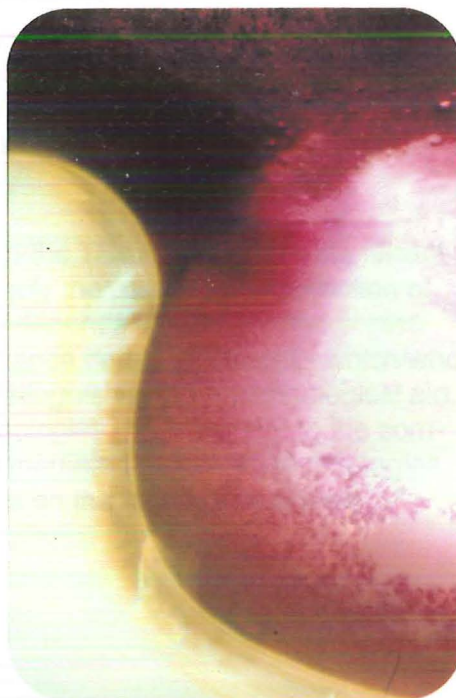
¹Barbara Maria Stafford is Professor of Art History at the University of Chicago. This chapter refers to her book *Body Criticism: Imaging the Unseen in Enlightenment Art and Medicine*. This thesis supports Stafford's call for trained visual artists to develop innovative visual expressions and to train the wider community in visual aptitude.

4.1. Art and Science:

Visual artists are skilled in and educated about the powers of visualisation techniques. They practise their ability to enhance or conceal information through different visual methods. The visual artist's strength 'consists precisely in the knowledge of visual rhetoric and its history' (Stafford, 1993, p.472).

Using technologies for the purpose of art is a great opportunity to explore and expand their utilities. For example, using medical imaging technologies as part of the TC&A Project enable us to communicate the beauty and mystery of small entities (which are concealed from the bare eye) and to form different links and meanings with the conventional presentation of medical scientific visualisation.

TC&A visuals may rely on medical imaging technologies as tools of production, however the "purpose" of the images is not to supply some factual data to prove a point for scientific research (or using the technologies for the sake of the technologies themselves), but rather to present to the wider community a source for visual play, and stimulation and to ignite further opening of visual and conceptual boundaries. TC&A visuals attempt to create further questions in relation to visualisation by medical imaging techniques, and not to give definite answers. Stafford refers to the visual artists who work with scientific data, asking: 'Who else will teach the difference between empty merchandising or narcotic, plasmic propaganda and the constitutive imaging arts, encouraging and persuading the actively engaged beholder to think?' (p.471). TC&A visuals are a tactile example of Stafford's request.



The link between the two disciplines (which actually have a lot in common, such as creativity, imagination and the attempt to make and communicate some sense of our complex environment) may yield new understandings of our environment and our position in that environment and will open up new uncharted territories.

We need to replace the pervasive strategies of reductive calculation, rigid criticism, and hierarchal dichotomisation with integrating democratic images. In short, we need to forge new metaphors. Such revolutionary embodiments or incarnated thoughts would demonstrate the independence and individuality of different types of expression. At the same time, they would evoke and provoke unusual and unthought-of connections and reveal possible points of conjunction (Stafford, 1993, p.8).

Catts (1996), who approaches biotechnology from a designer perspective, maintains that 'biotechnology will provide a new set of aesthetics and a new way to generate a variety of forms and objects that would never have been possible before' (p.3). Catts emphasises that this new aesthetic may change the way some ideas will develop and some concepts will evolve.

In the light of the developments in biologically related technologies, this field can be approached in many directions. Artists can explore this arena to create visuals and artefacts never explored artistically before. Furthermore, artists can investigate not only the new aesthetic realm of biotechnology, but can and should explore in their work the social and moral questions it raises. Biotechnology charts new lines on the human evolution map; blurring the boundaries between the organic -non organic, human- machines, living entities and non-living entities. -

4.2. Remote Sensing Photography:

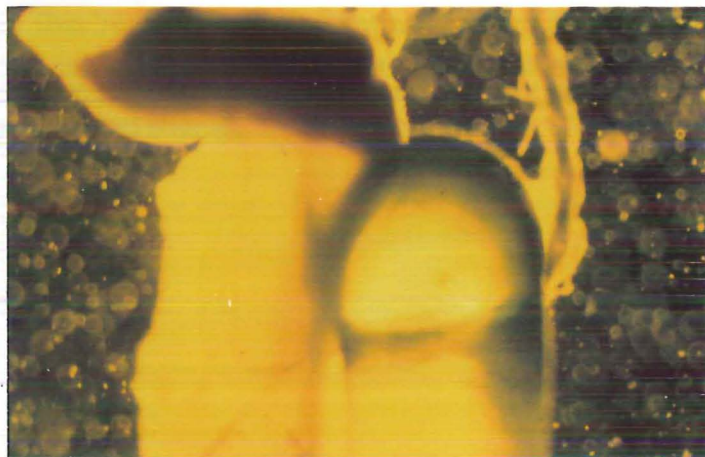
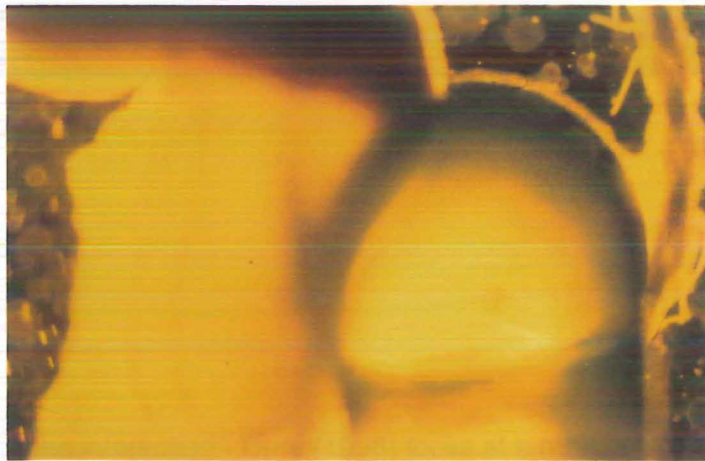
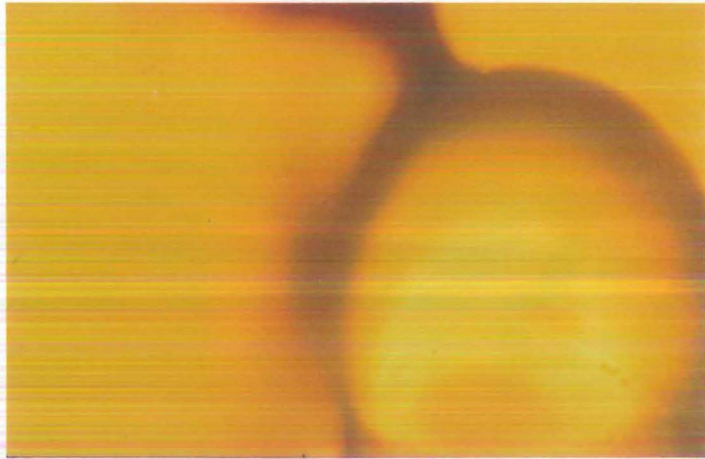
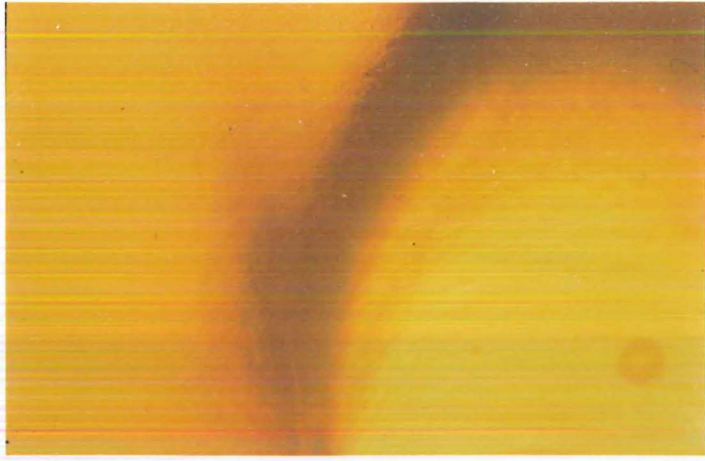
The use of Remote Sensing Photography technologies in the TC&A Project is a significant one. Firstly, at this stage of the project the ability to show visually the growth and interaction of the cells with the biologically friendly and non-organic objects depends on these technologies. Furthermore, the artists use different dying techniques to enhance details of the cells which/who are “naturally” of a clear colour, that the human eye cannot distinguish without technological aid.

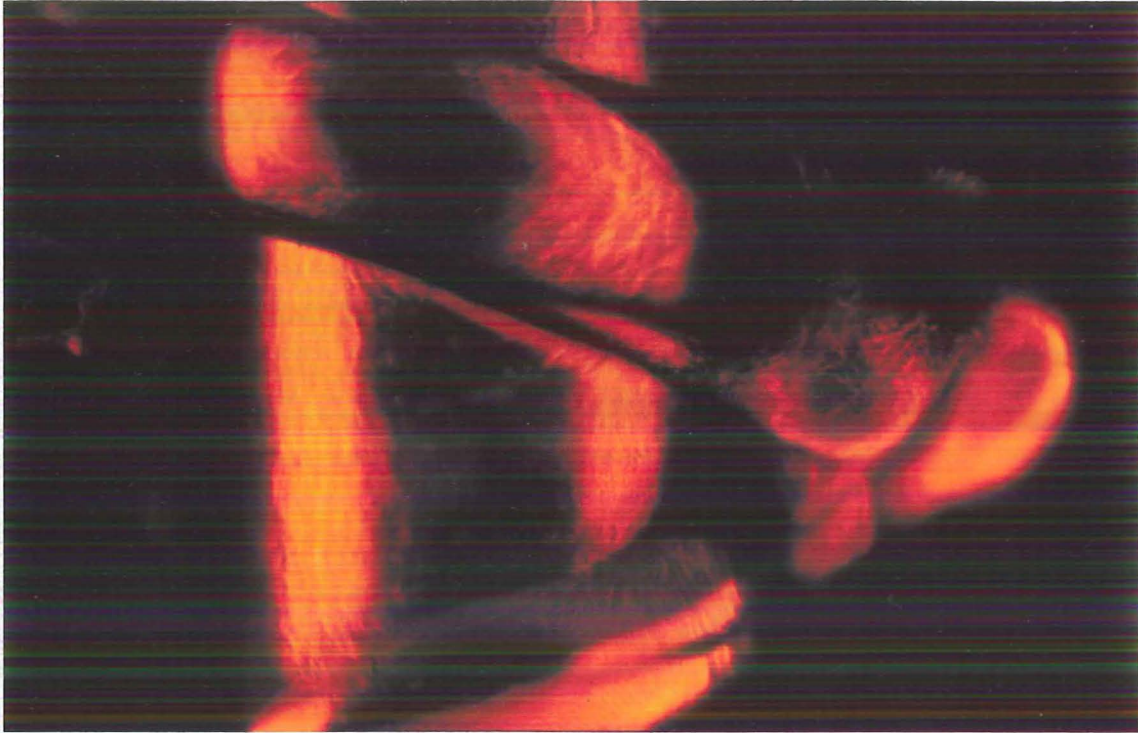
Secondly, the use of remote and enhancing sense technologies is self evident to the complex relations among humans and their environment which is mediated by human technologies. The way we see and make sense of our environment depends on the technology we use.

(see appendix 3)

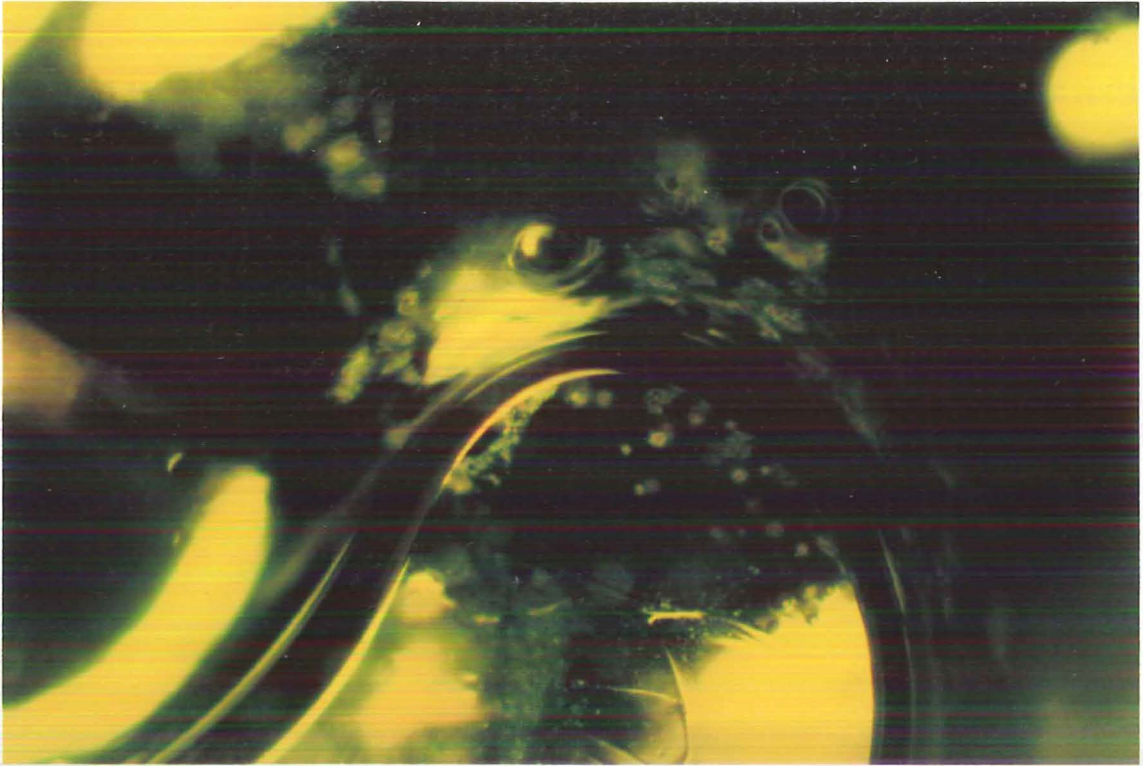


Scale - TC&A attempt to make people think in different scales - We are only part of something bigger. We have to learn to think not only from a human-centric point of reference, and from the Self/Other dichotomy, but rather shift to different scales and different possible points of view.



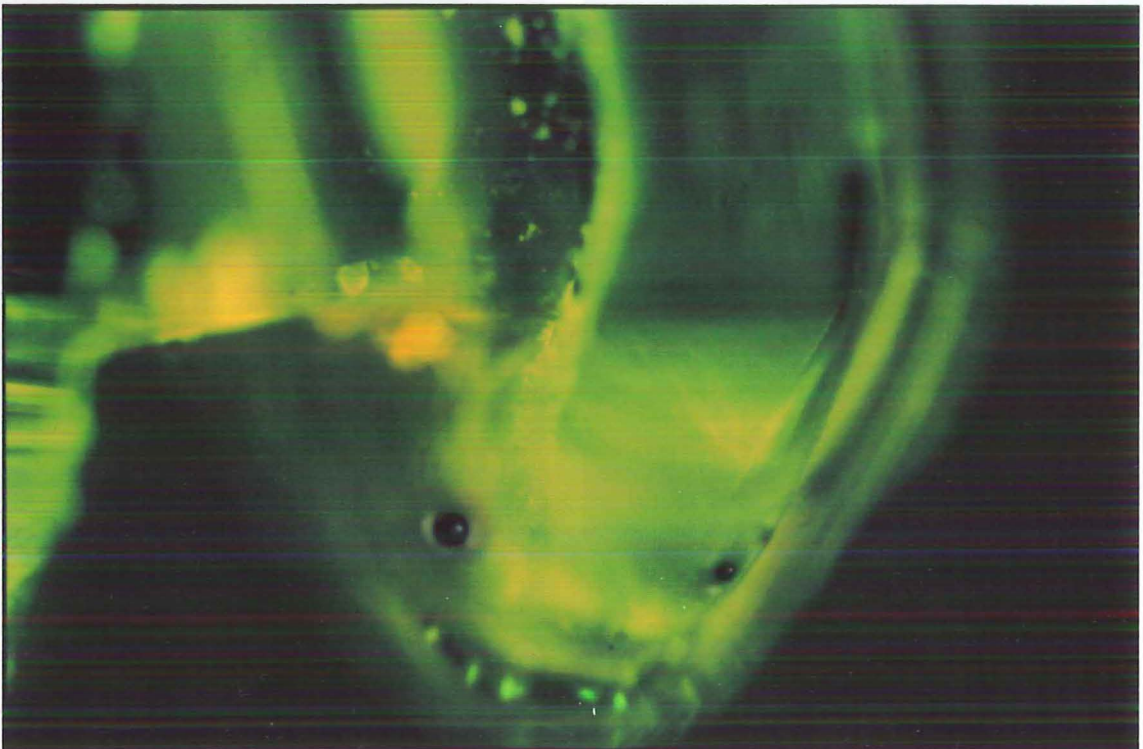


Organic and non-organic shapes interacting - Dery (1996) looks at a more cyclic phenomenon in which 'The hallmark of a neo-biological civilisation...returns the designs of its creations toward the organic, again' (p. 322) This "return" to nature, however, is from a completely different angle; that is away from "new age" tribalistic rituals of magic, and more towards the interwoven interactions of organic and non-organic entities. TC&A attempts to present combined and interactive organic and non-organic entities and shapes.



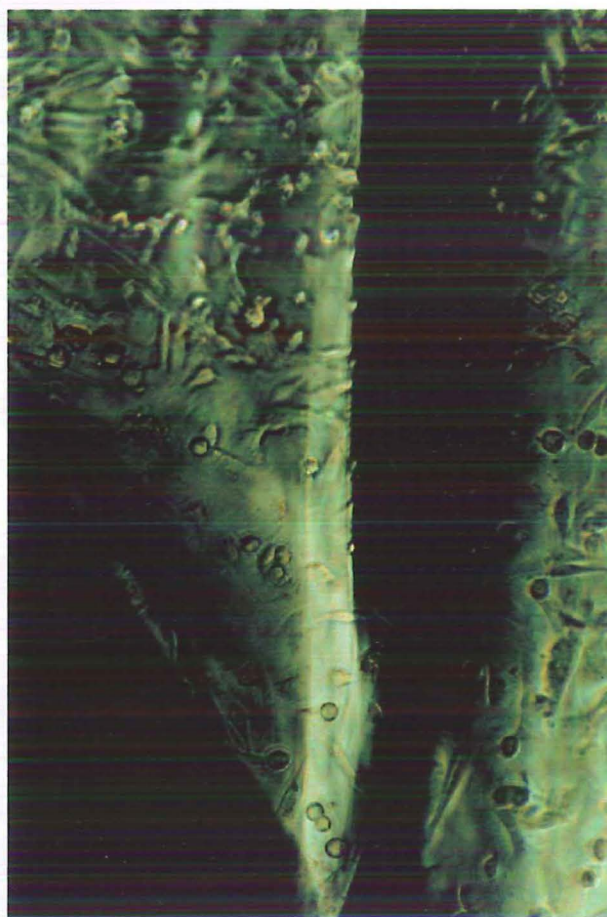
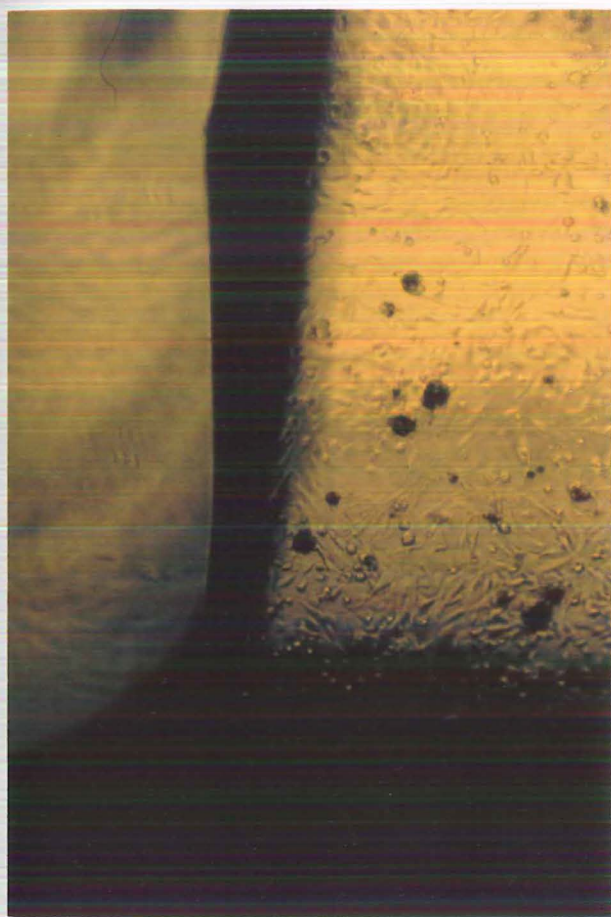
Monsters:

'The power-differentiated and highly contested modes of being of these monsters may be signs of possible worlds - and they are surely signs of worlds for which we are responsible' (Haraway, 1991, p.2). The TC&A project celebrates the "in-between". The cross boundaries creatures are signs of possible futures.



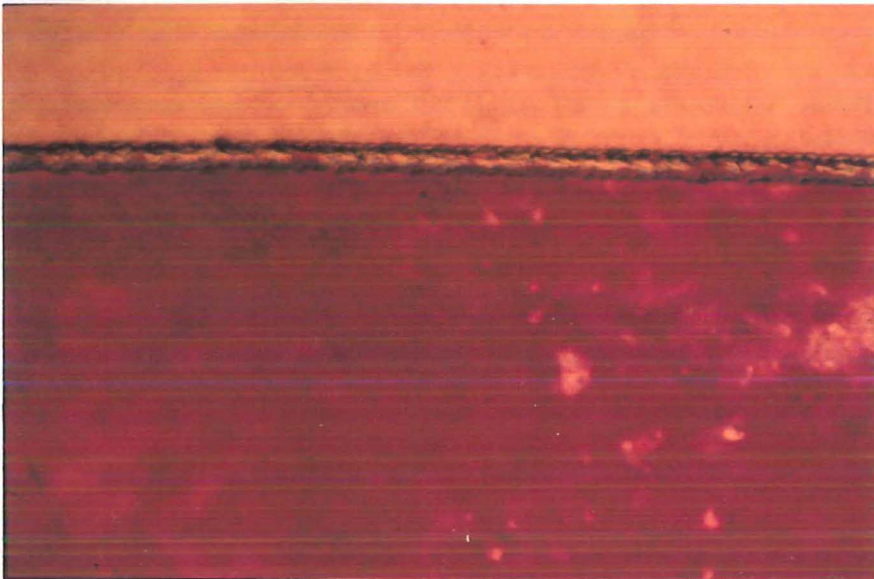
(The fluorescent pattern was created by the cells metabolism rate. The image was further manipulated by the artist).

texture & tactility - TC&A believes that Humans need physical contact with organic surfaces for their well being.

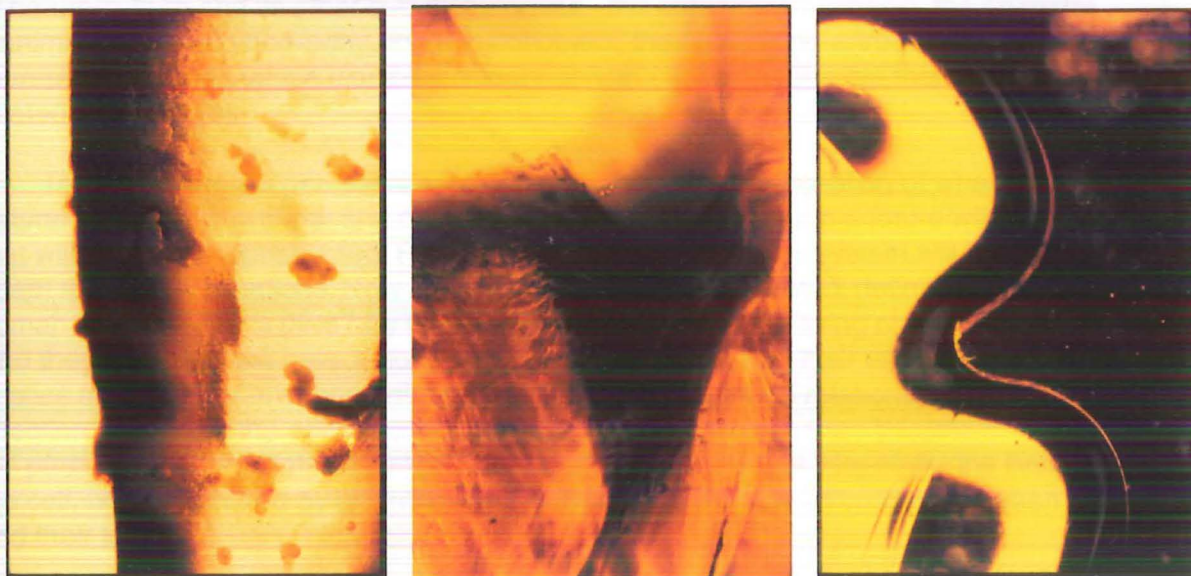


Cartography -

The map in the mind provides the grid points of cognition; and our new maps of distant and abstract landscapes promote new geometries of thought - new associations and therefore new ways of thinking about the world "out there". (Hall, 1992, p.20).



Sexual - metaphors - It is human nature to look at new visuals and metaphorise them to something familiar. This creates a sense of play when looking at the new shapes created by the TC&A project, and the search for signs of familiarity.



4.3 TC&A Artefacts:

The TC&A Project is a hybrid experimental media art. It incorporates three dimensional sculptures with two dimensional and three dimensional visualisation and animation.

In his book *The Evolution of Technology*, George Basala discusses the relations between humans and their 'things' by employing a metaphor of natural evolution to explore the "evolution" of human-made objects. Basala (1988) maintains that 'the artefacts that constitute the made world are not a series of narrow solutions to problems generated in satisfying basic needs but are material manifestations of various ways men and women throughout time have chosen to define and pursue existence' (p.14). I believe that TC&A "things" should be looked at in the same way. Hence, as 'things' which push the boundaries of traditional definitions and separations of entities according to them being organic, alive and animate as opposed to non-organic, non-living inanimate ones. This new conceptualisation will ignite further change in the way we perceive the world around us and its entities, including ourselves.

Biotechnology is an exciting (some might say - frightening) and rapidly growing field with enormous consequences for humanity. This field should be explored from many angles and perspectives. Following Stafford's belief, TC&A follows the agenda that 'from a combined investigative strength - composed of different talents focusing on the same perceptual problem - should finally arise a properly visual hermeneutics, the imaging art-science of tomorrow.' (p.472). The artwork produced by the TC&A project visualises and conceptualises possible futures, and opens up paths for further imagination.

5.0 CONCLUSION:

TC&A artefacts are a hybrid of living and non-living entities. They are a celebration of the "in-between". The artefacts can be seen as a way of presenting an escape from old, rigid and no-more applicable boundaries. This paper looked at the blurred boundaries of the meta-dichotomy of nature/culture and its other sub-dichotomies - the organic/non-organic, the animate/inanimate, the living/non-living, the subject/object, the I/other and art/science. The TC&A Project represents artefacts which blur these binary constructions through the theme of biologically related technologies.

The TC&A project perceives a future in which society's perception of what is alive and natural and what is artificial and non-living will be redundant. Such a future will yield new maps that will have to be constructed. Furthermore, the current values system will have to change and adapt to the new situations. New definitions will have to be created; definitions such as what is human or even what is alive? By creating and introducing semi-living objects, humans (whatever kind they might be) will have to form different relationships with their environment and the entities of which this environment consists. Nevertheless, these relationships will not be in one direction, but rather the entities will respond in accordance to human treatment. Living objects will push human-tools' interdependent relationships even further. Hopefully, the living essence, the cell, which is shared by all entities, will create more equal relationships between humans and their tools.

The TC&A project attempts to communicate such possible futures to the wider community through the use of artistic expression. I would like to stress that this art form is an open process which is adaptive to future changes. This art expression can be seen as a ritual of current times which encourages and stimulates further play and creativeness toward the future, rather than the dominant contemporary paralysing fear of the unknown.

The TC&A project seems to be an important expression in current times. It has already generated media attention from art bodies in Western Australia, and Australia in general, from the more popular youth culture such as the article in Soup Magazine (due in the end of March 1998), the article in PC @uthority Magazine, Sydney (due in June 1998), and from the scientific community such as the Lab News Magazine located in Sydney (see appendix 4). This wide response emphasises the importance of such a project to address the needs of contemporary culture. Contemporary culture must deal with rapid changes to which traditional values and norms have ceased to apply. Dealing with such a cultural void through the theme of "art as play" is the optimum way to create a sense of an imaginative and stimulating attitude towards the future. This art form also links different disciplines such as art, science, technology and the humanities.

The artists of the TC&A Project are currently engaged in Stage Two of the project. This stage is concerned with expanding its artistic pallet. The artists are growing muscle tissue over plastic objects. The artists hope that when and if the cells engulf the object completely, by the introduction of hormones, the cells will extract and expand (as muscle cells tend to do) and the artefact will move. Such artefacts will visibly question the border of an organic moving and living entity as opposed to non-living inanimate non-organic one.

Drawing on Hall's metaphor, this paper mainly aims to open up and expand the reader's conceptual map, stimulating further discussion and construction of new maps created by biologically related technologies. These technologies can be also utilised by artists for further artistic exploration and innovation as visually presented in the paper. Again, the TC&A project is an on-going process which is open to changes and shifts in its future development.

Future Scenario 2 :

Description:

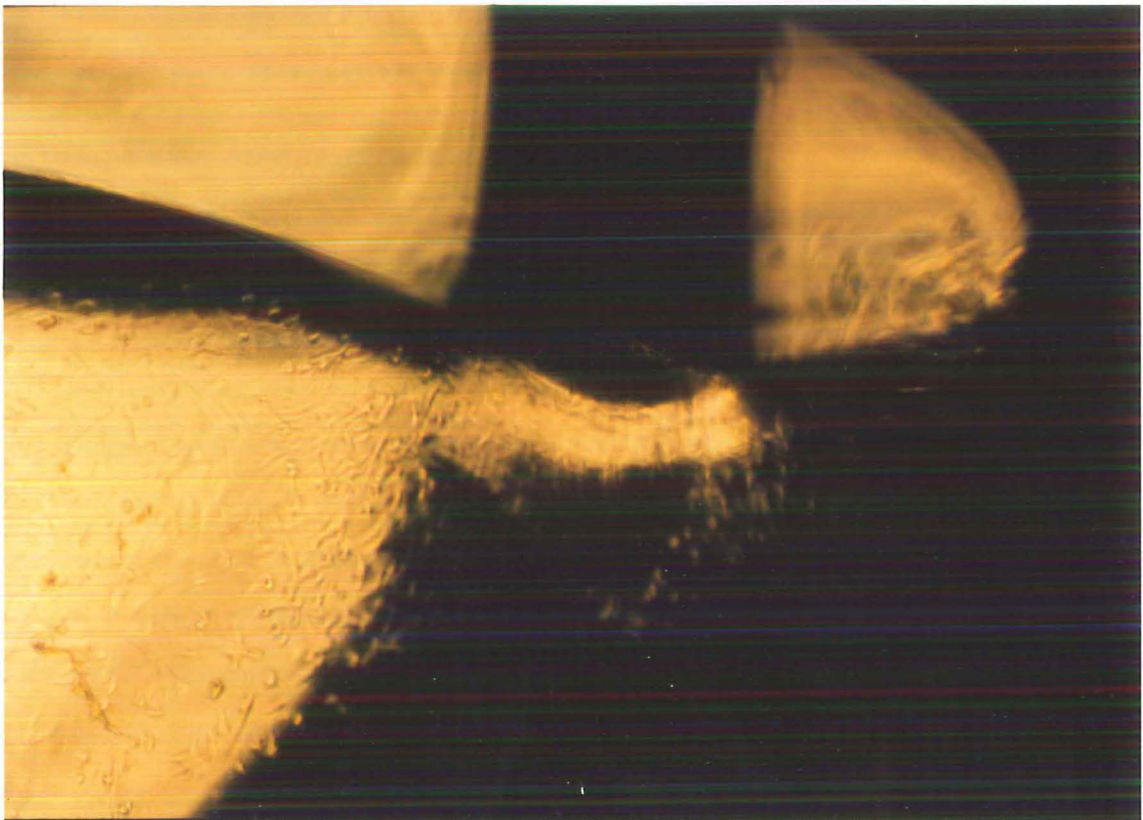
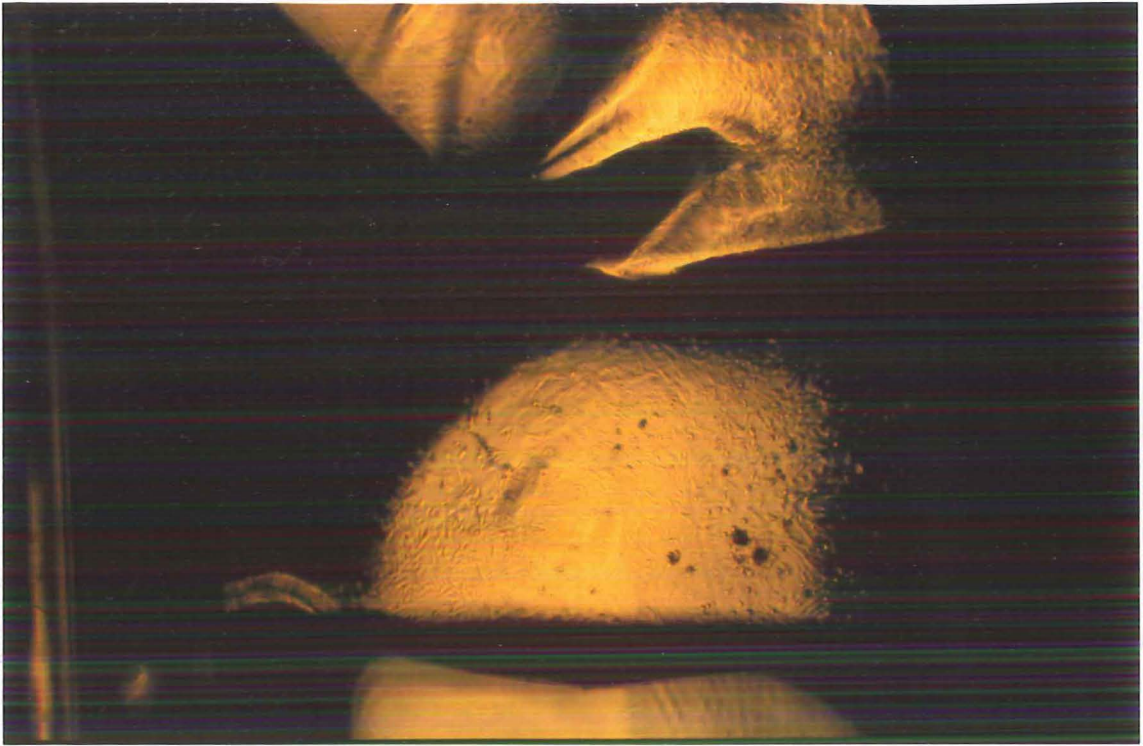
Your eyes are fixed on an ornament "happening" in the soft corner of the room. It has this strange look of a living object. At first glance you think it is a cast of an unusual organic shape, however this cast seems to be growing. It does not look like any sort of plant you have seen. In many ways it resembles some hybrid of organisms, a bit like a coral. When you touch it it is soft and pleasant to touch (almost like caressing your pet). It does not move, but you notice it reacts to your touch and it is very sensitive to its environment. You realise it is almost alive and inter-actable. Without even being conscious about it, you know you have (and want) to be gentle and attentive to this "biornament". After all, this semi-living object consists of bio-materials which are part of your and other organisms' bodies.

Explanation:

This "biornament" is a living ornament designed to fit the interior decoration of the living room. It is made of non-organic scaffolding and bio-degradable frames, on which tissue is being grown. This could be achieved using existing techniques for skin growing in vitro for wound therapy (Navsaria, Myres, Leigh, and Mackay, 1995). The "biornament" is equipped with bio-reactors and bioprocessors in order to provide nutrients and other chemicals for the development and maintenance of the tissues, to maintain the temperature and protect them as well as removing harmful waste from them. The external layer of the tissues resembles a skin tissue which operates as an insulation from the external environment.

(Future Scenarios were written in cooperation with Oron Catts).





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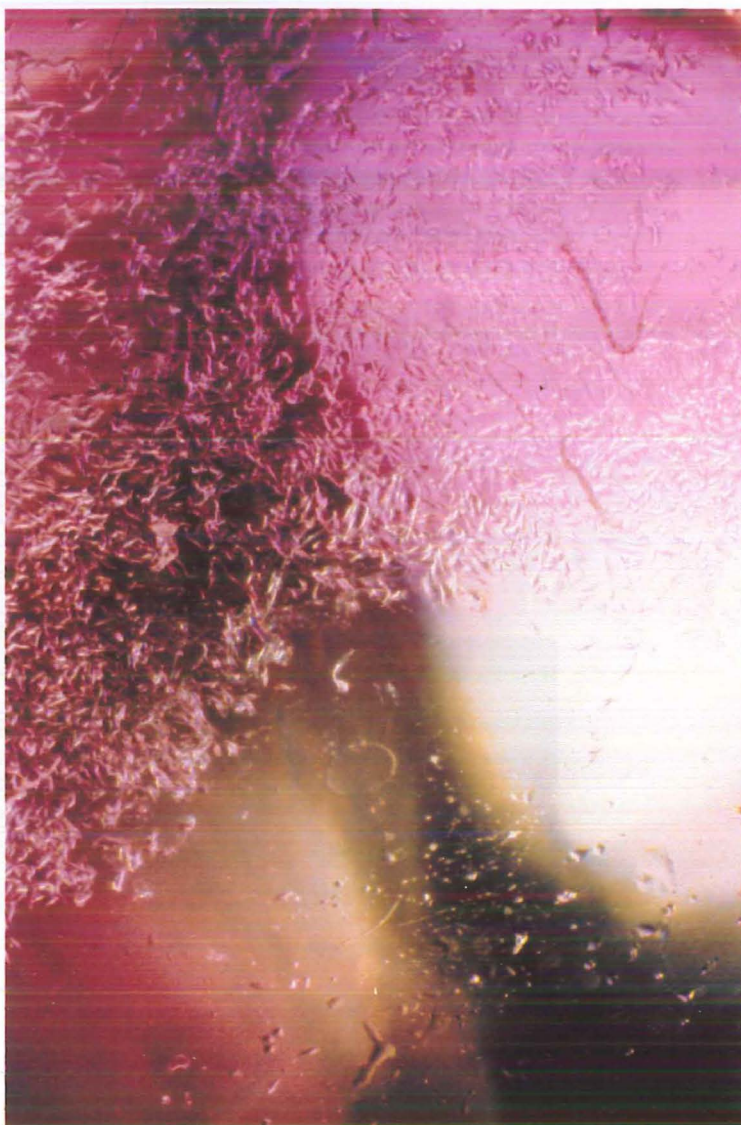
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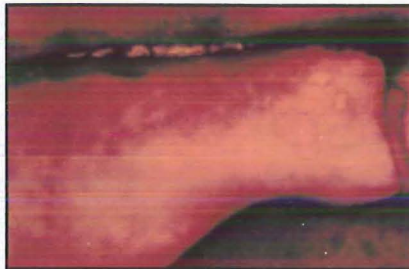
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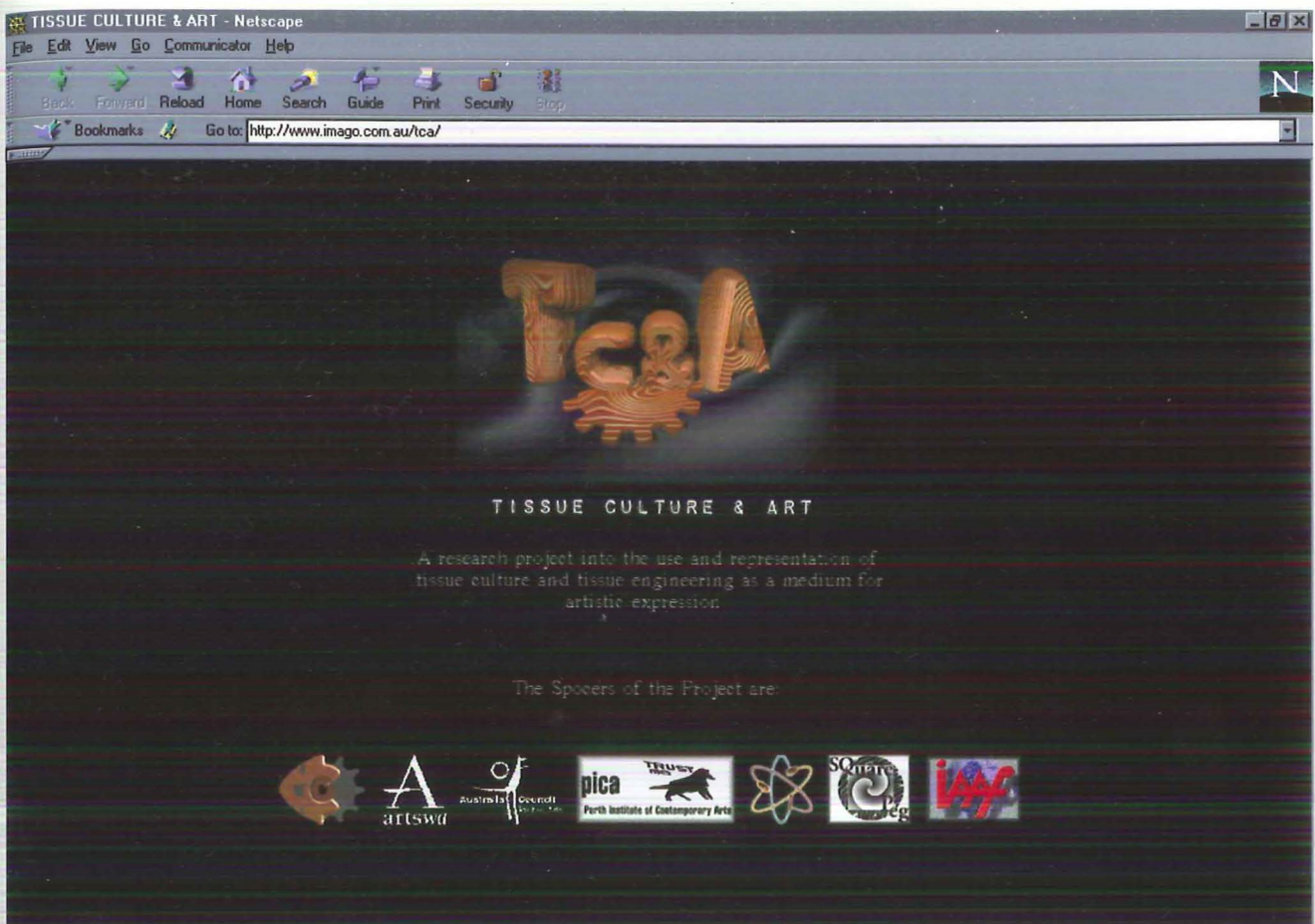
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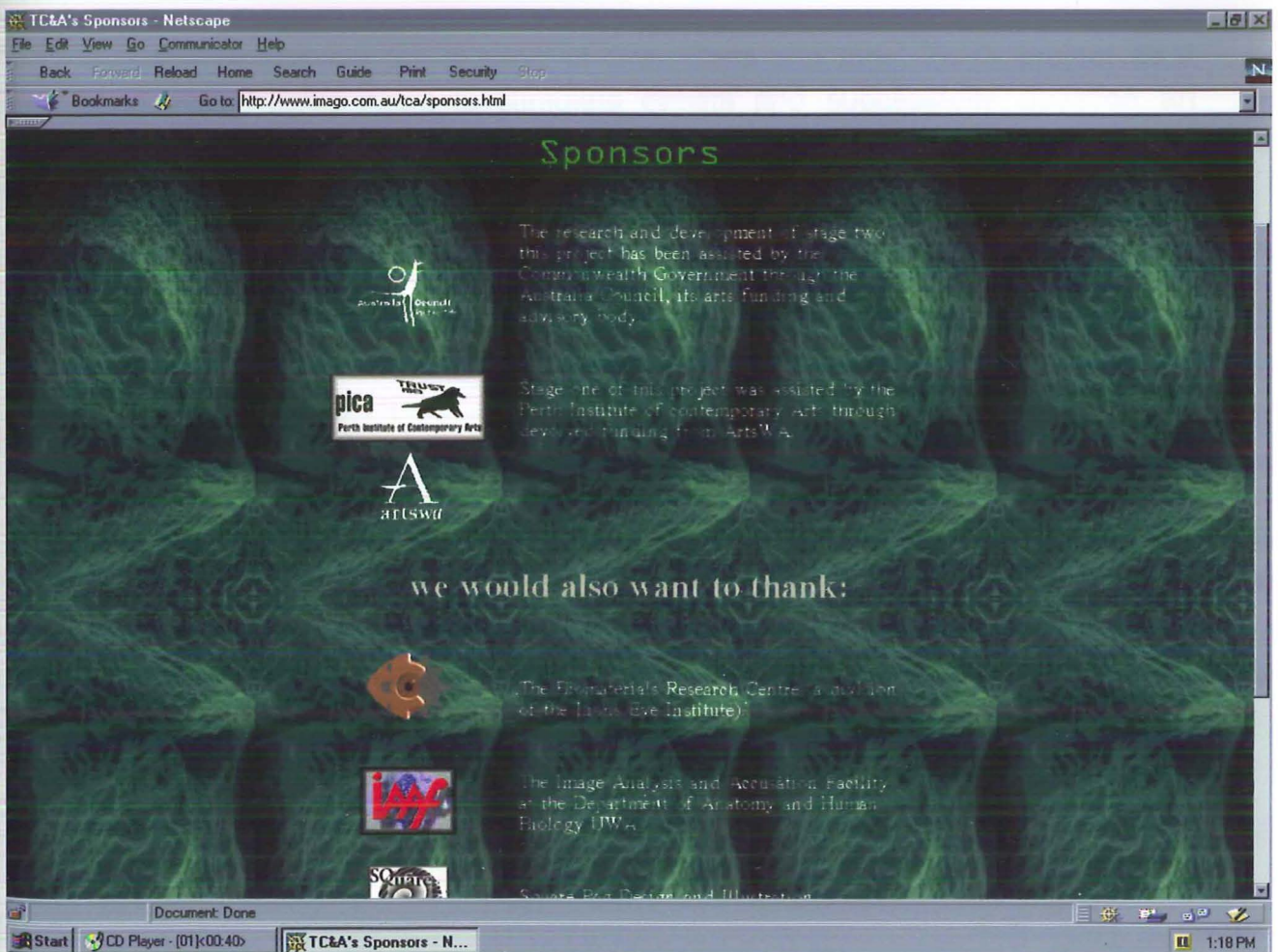


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Perth
Institute of
Contemporary
Arts

Arts Development Fund
ArtsWA

10 February 1998

To the Arts Development Fund

The Perth Institute of Contemporary Arts (PICA) is delighted to be supporting the *Tissue Culture & Art* project, developed by Oron Gatts and Ionat Zurr, which explores the use of tissue culture as an artistic medium.

Tissue Culture & Art will be presented at PICA during the August 1998 exhibition period, opening on Wednesday 5 August and continuing through until Sunday 6 September.

We extend our full support of Oron Gatts and Ionat Zurr's project as it fulfils PICA's intent to stimulate debate and successfully question art conventions and processes. Similarly, we would encourage further support to enable this most ambitious and unusual project to be realised to its full potential. We anticipate *Tissue Culture & Art* be one of the most significant exhibitions in our 1998 program of events.

Yours sincerely

Katie Major
Exhibitions Officer

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Perth Cultural Centre
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Telephone (618) 9380 3486

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January 28, 1998

To: ArtsWA - Arts Development Panel.

I am writing in support of a proposal by Oron Catts and Ionat Zurr for an installation at PICA to present the results of Stage One of their Tissue Culture & Art project. They have undertaken this work in collaboration with our Department and we have been strongly supportive of this project since its inception, early in 1997.

The project combines their skills in design and research and photography with real biological material and the facilities of the new Facility for Image Acquisition and Analysis. The visual interpretation of this work is of considerable interest to the general public and helps to foster a greater understanding and appreciation of scientific activities and new technologies, particularly relating to the areas of cell biology and tissue engineering.

Our Department is very keen to foster collaborations with artists as evidenced by support in August, 1996 for the exhibition on "Art, Medicine and the Body" held at PICA, and for the issue of Artlink (June 1997, vol 17: 2) also dedicated to "Art & Medicine: Imaging the body". There is strong interest from many groups in the areas of Art with respect to Science and Medicine. I am surprised at the number of artists (painters, sculptors, designers and even dancers in WA) that I encounter with a desire to explore these areas further. Beyond the individuals, there is considerable interest in these activities from the wider community including: other local and international Departments and Institutions (e.g the Walter and Eliza Hall Institute, Melbourne – inaugural Art prize; The Wellcome Trust - recent catalogue on Sci-Art), Scientific Societies (e.g the Australian and New Zealand Society for Cell and Developmental Biology who is starting an "Image bank" and intends to hold an Art exhibition at its national meeting next year), commercial companies (e.g. the Australian biotechnology company AMRAD who are now sponsoring an "Image of the year Award" with the journal Life Science; and Nikon who run an International "Small World" competition for photomicroscopy- published as a calendar).

In this climate of rapidly expanding interest, I strongly support this exhibition by these 2 innovative young artists. Furthermore, I have been asked to write a short preface to the Catalogue and am very pleased to do so.

Yours sincerely,

Miranda Grounds



1
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16 June 1997

The Australia Council for the Arts
New Media Art
Sydney.

To whom it may concern,

This is to confirm that I am happy to support Mr Oron Catts' and Ms Ionat Zurr's application to produce "living works of art".

As director of the Image Acquisition and Analysis unit at the University of Western Australia I can confirm that we can provide state of the art facilities for documenting, describing and illustrating the results of this project.

The unit, funded by the Lotteries Commission, can provide first class facilities for microscopy, video microscopy, image capture and subsequent manipulation of those images. We have graphic workstations and associated software for the reconstruction of three dimensional objects as well as the manipulation and creation of three dimensional objects and animations. A full list of software and hardware currently available is attached. The unit employs a full time manager who can provide initial training and user support for Oron and Ionat.

As a biologist I have been involved with Oron and Ionat for a year and have been most impressed with the novelty and challenging nature of their ideas. They have a practical approach to the technical problems faced in their work. I am convinced they will be able to produce some exciting work if funded. Oron has put on a seminar on his work for our staff and students. His work serves its purpose admirably of stirring up debate and controversy, forcing us to address the social context of our own biological work.

Yours sincerely

Dr Stuart Bunt

Ref: 002981et

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28 January 1998



ArtsWA
Arts Development Panel

AFFILIATED WITH
The University of
Western Australia,
Sir Charles
Gardner Hospital,
Royal Perth Hospital,
Fremantle Hospital
DIRECT.

Dear Sirs, Madams

I wish to support the proposal by Mr. Oron Catts and Mrs Ionat Zurr that the results of the project Tissue Culture & Art (stage one), be presented as an installation at PICA.

I strongly believe that funding should be given to set up an exhibition, based on the following aspects:

- Oron and Ionat performed experimental tissue culture work in our departmental laboratories, and I had the opportunity to see first-hand their dedication and activity. Uncommonly for non-biologists, they very fastly managed to comprehend the intricacies of tissue culture and to perform the experiments with minimum supervision or advice. They became familiar with such topics as polymer surfaces, growth of cells, staining techniques and microscopy.

Continued/2.....

(2)

- The presentation of these results will certainly highlight to the wide community the fundamental role that cells and tissues play in our life on this planet. It will also create a positive image for scientists, in this case the biologists and medical researchers. A similar exhibition was recently set up in Nottingham, UK, but the concept was different, as it tried to show the beauty of molecules and their importance in everyday life and to improve the image of chemicals and chemists. The project was supported by no less than four prestigious institutions, and the scientist who developed it received the Science Communicator of the Year Award. Similar events are frequently organized in the USA. Clearly, there is a great effort in industrialized countries to provide to the public a realistic image of scientists. It is time for us to do the same in Australia.
- I have no doubt that Tissue Culture & Art exhibition will contribute essentially to the public understanding of science.
- Apart from the social aspects, this project is definitely very innovative, both artistically and scientifically. It allows us, the scientists working on the interaction between polymers and living matter, to see some of our work transformed into art, and this is indeed a unique opportunity that now has become possible in Western Australia thanks to Oron and Ionat.

I am happy to recommend their proposal for funding. This is the result of talent and hard work; its presentation to the public will be an exciting event, with positive consequences for community, artists, and scientists alike.

In the eventuality that funding will be offered, I am prepared to write, on behalf of the scientific community, a brief preface for the exhibition catalogue.

Yours sincerely

T.V. Chirila



Brendon Griffin PhD
Senior Lecturer

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10 November 1997

Mrs Ionat Zurr
83B Eton Street
NORTH PERTH 6006

Dear Ionat,

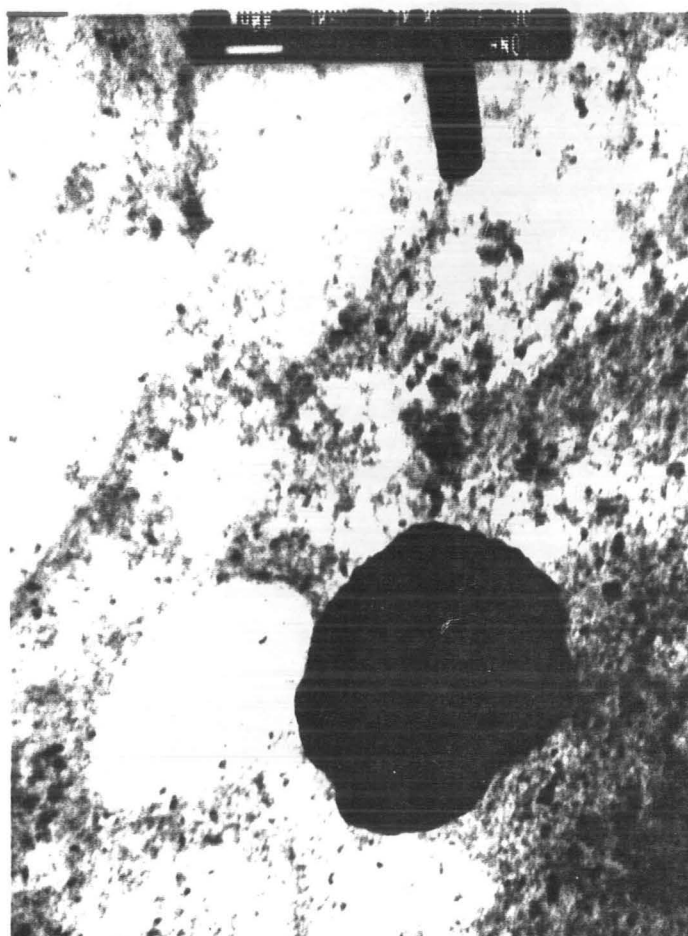
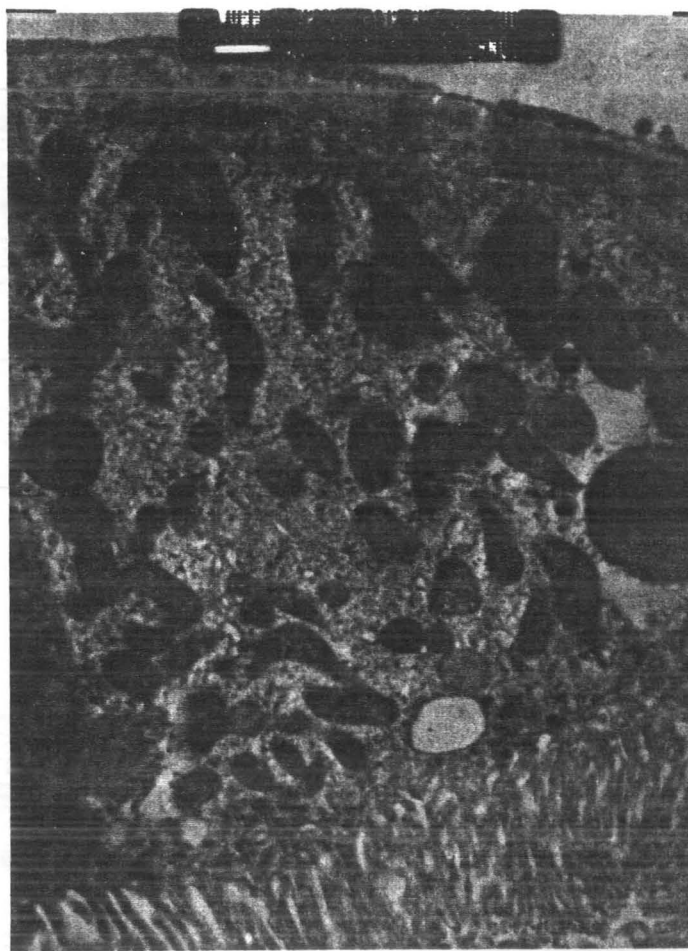
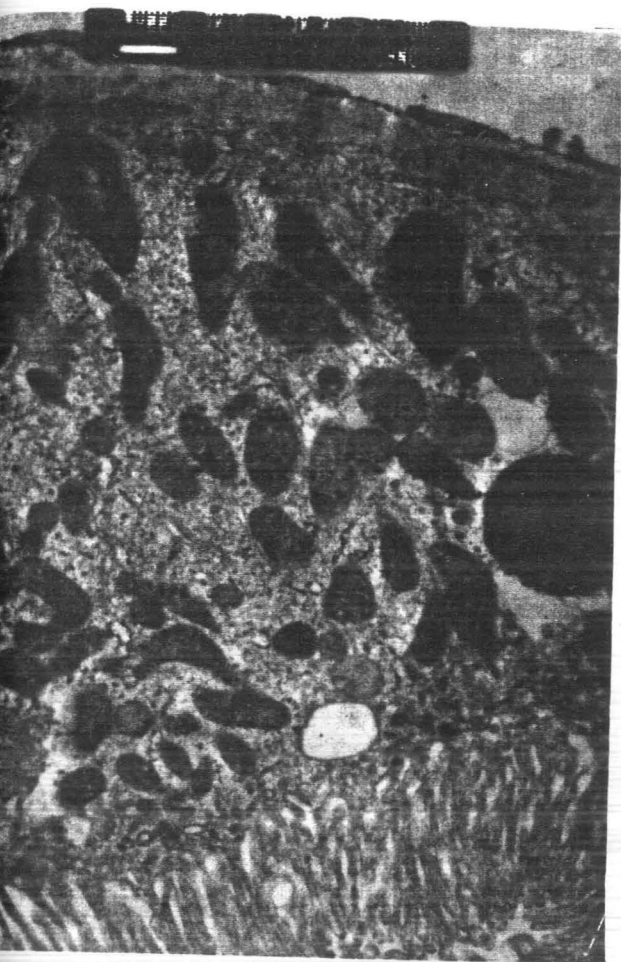
Scanning Electron Microscopy Course
3-4 November

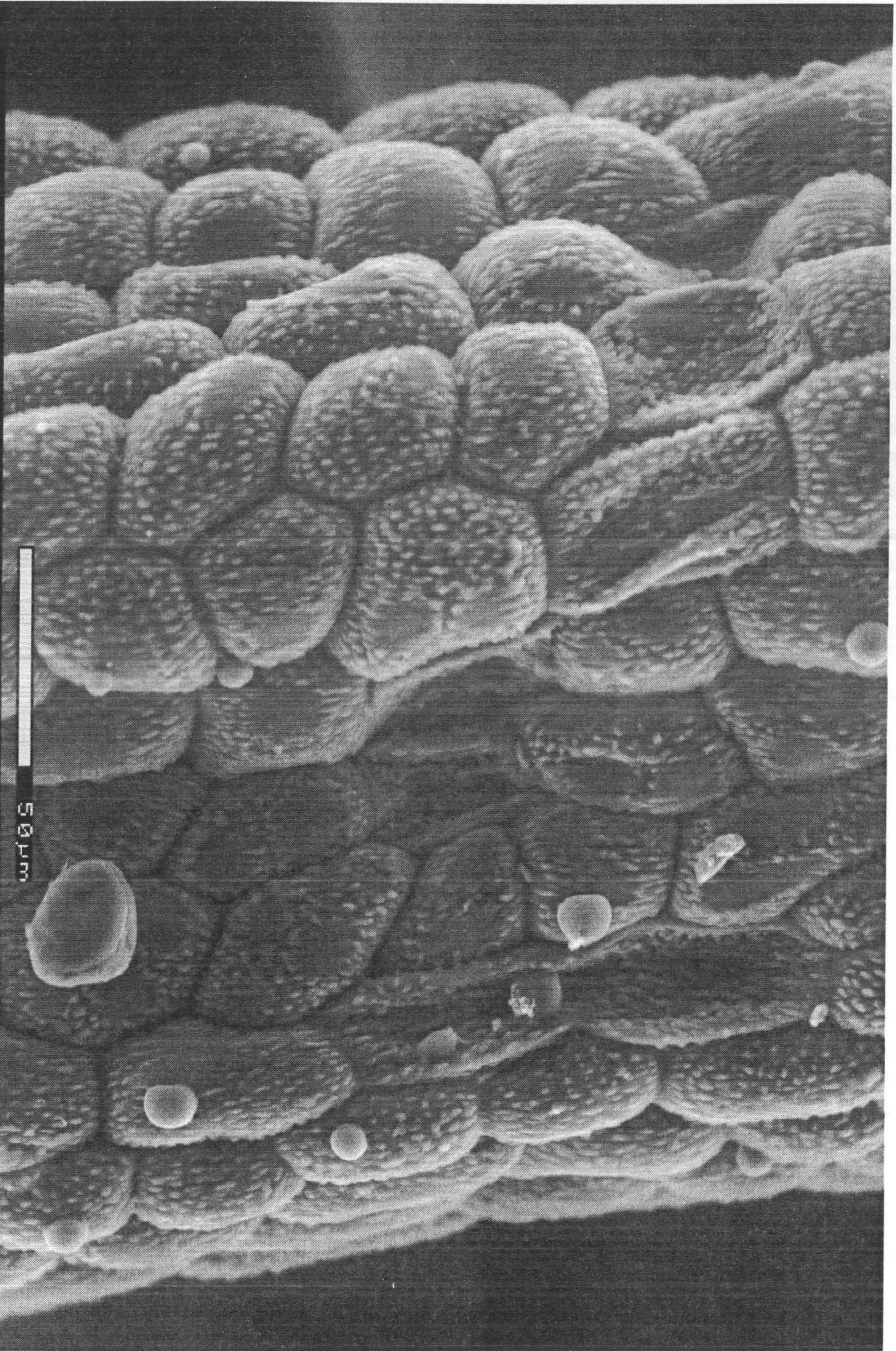
You have successfully completed the above course at the Centre for Microscopy and Microanalysis. I will be your advisor in the Centre, and I would ask that you contact me on 9380.2739 or by email to arrange your first booking and/or discuss your planned work.

If you wish to become a user please come into the Centre and register on the user friendly computer. Centre staff will help you with this if you have difficulties. Once you have completed registration, time may be booked on the instruments you were trained on. Initially you should only book time between 9am and 5pm to ensure that staff are available to assist in case problems arise.

Yours sincerely,

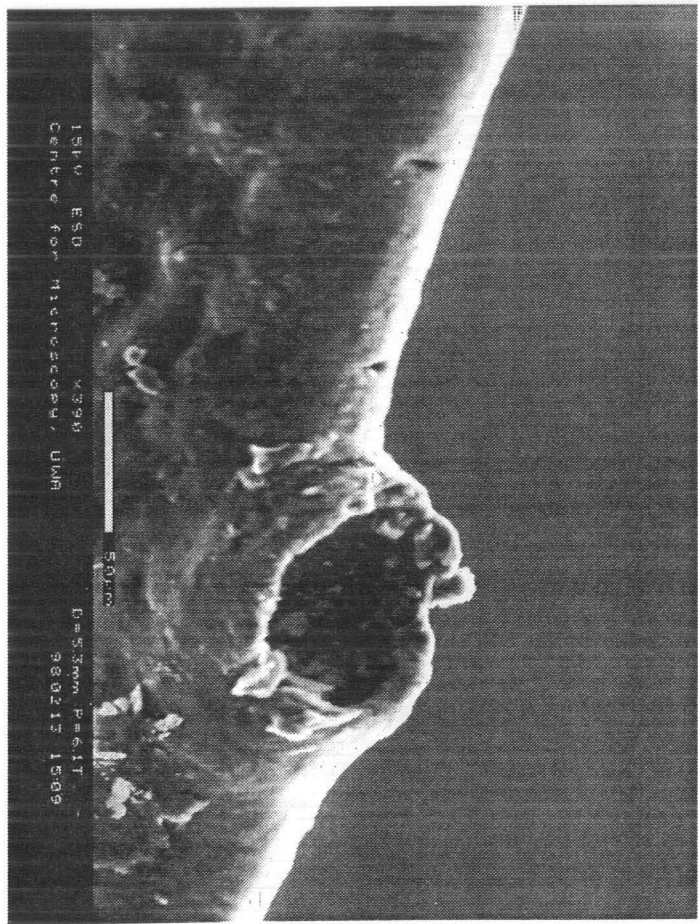
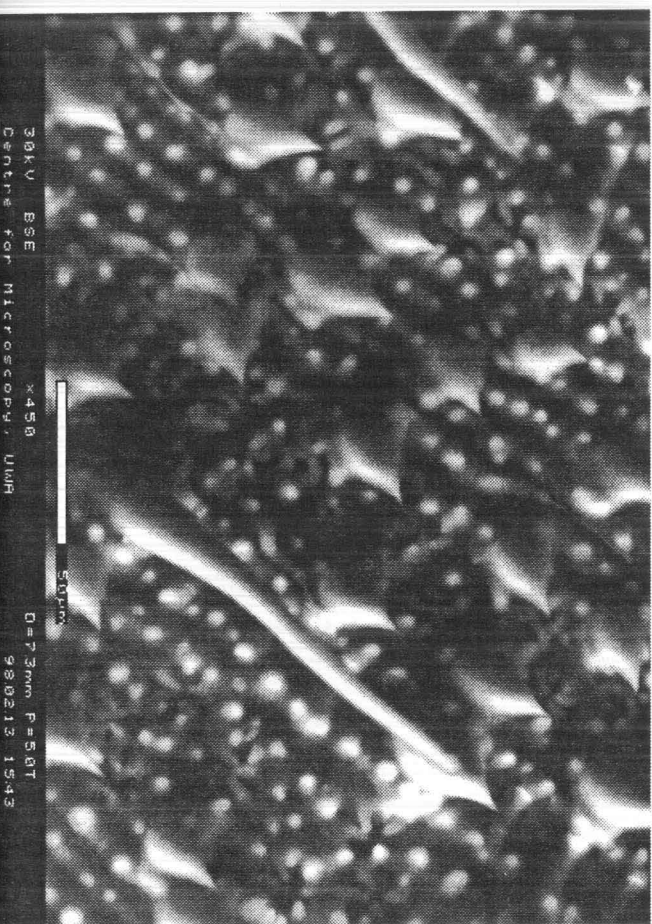
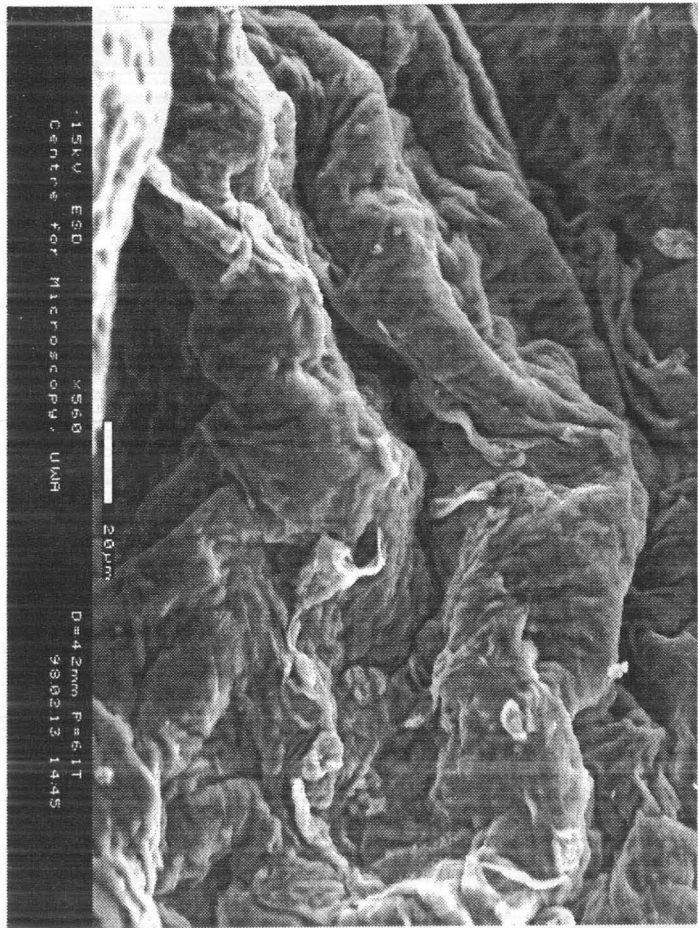
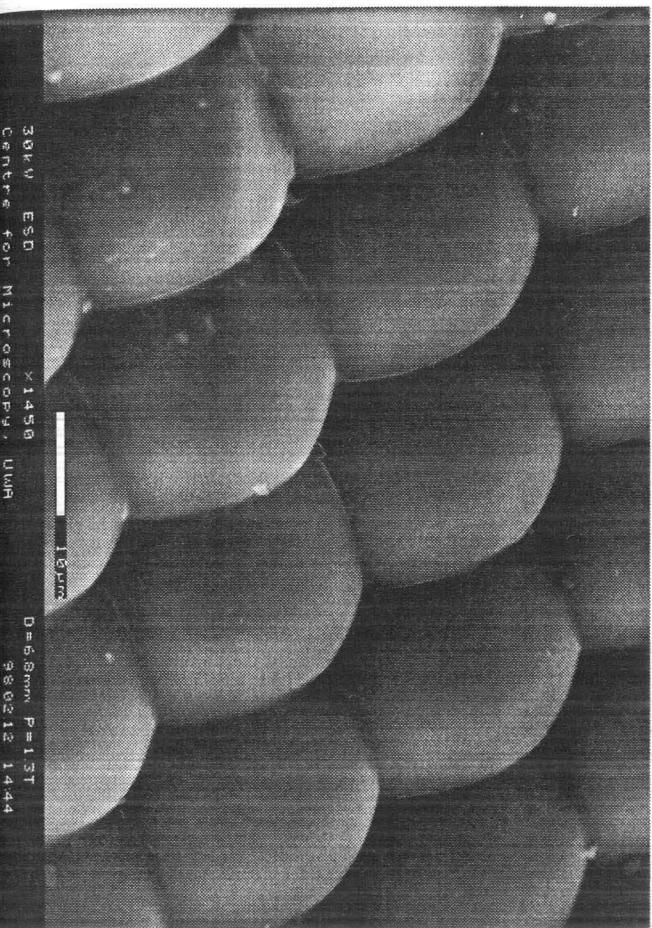
BRENDON GRIFFIN
Senior Lecturer

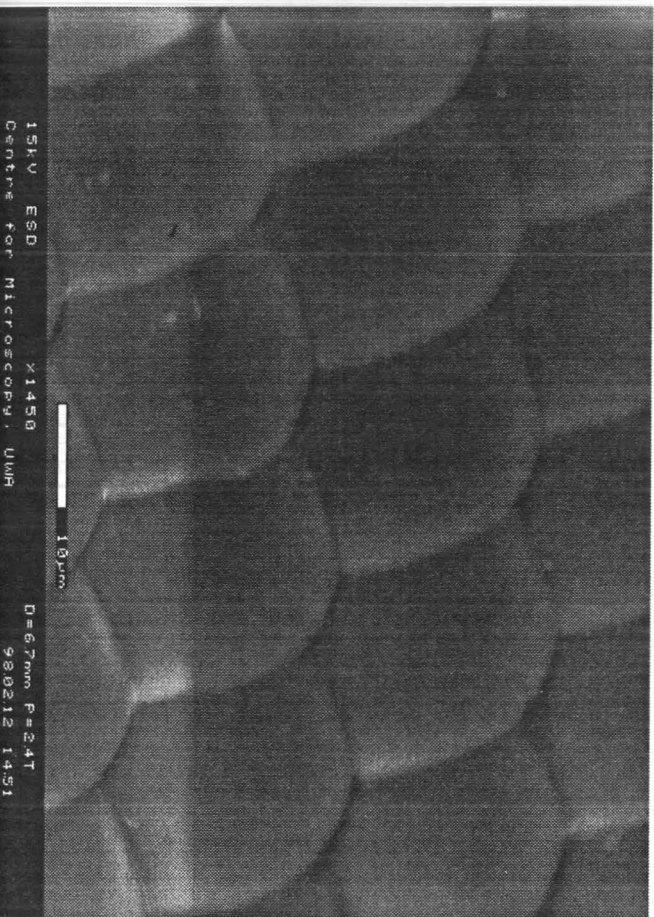
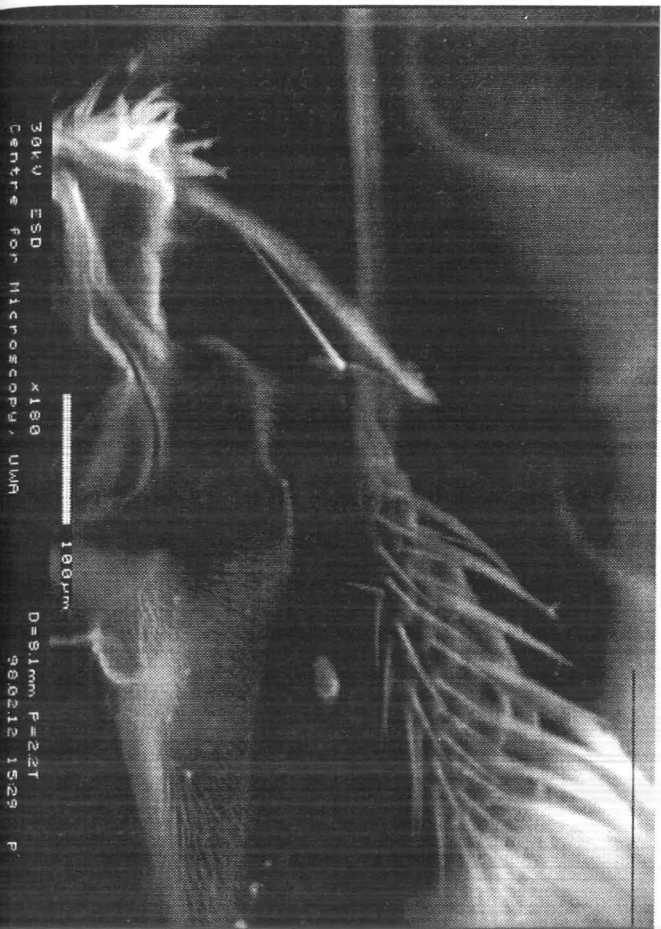
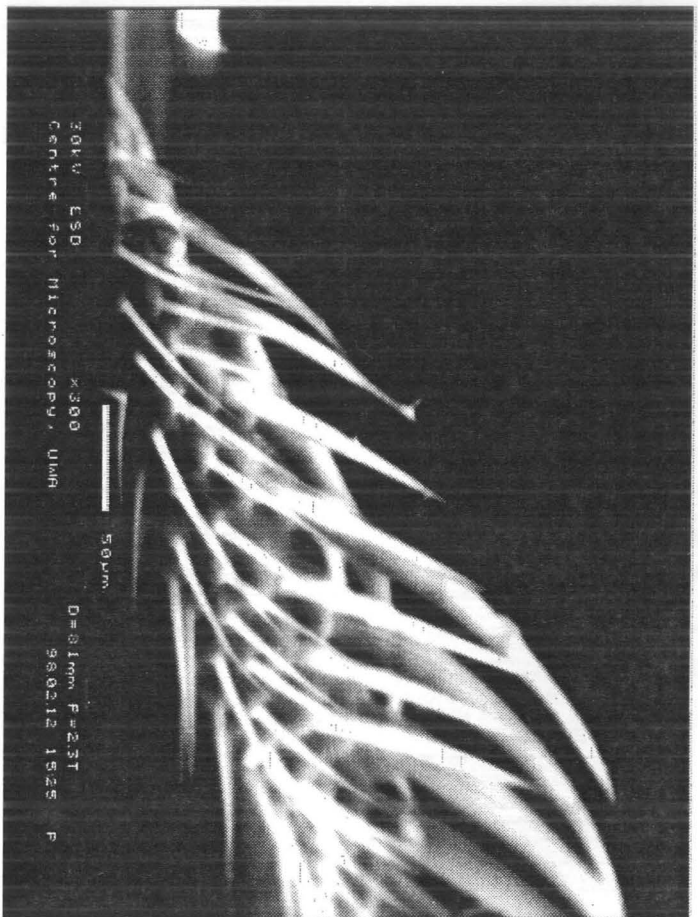
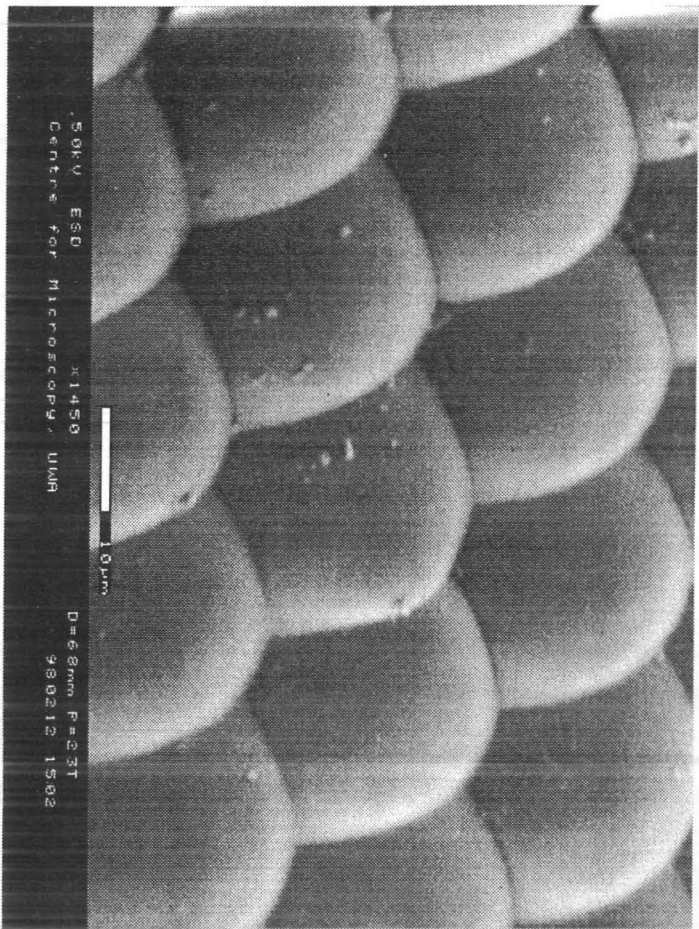




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Centre for Microscopy, UWA

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INSIDE



en and justice — page 2



AIDS project — page 3



Photo competition — page 4



Safe food — page 5



Bookshop move — page 7



Oron Catts and Ionat Zurr with an image from their ground breaking work.

Biotechnology from an artistic perspective

By Anthea Macrides

tissue taken from a rabbit's eyeball, grown in a cog-wheel, may not immediately be used as art.

for Oron Catts, a lecturer from the School of Design at Curtin, and his partner Ionat Zurr, a media student from Edith Cowan University, tissue culture and engineering is an exciting medium for artistic expression and not, Catts says, a medium to scare people.

The idea behind the 'Tissue Culture & Art' project is to grow, monitor and present partly living tissue as pieces of art. In this project Catts and Zurr use tissue culture (fibroblast and epidermal cells) to create three-dimensional structures, formed of living tissue that is kept alive and grows as part of an organism but with artificial support, according to Catts, become an "exciting artistic palette which never existed before".

The palette is being used not just to create new forms using a unique combination of shapes, colors and movement, but also as an artistic medium and investigation of possible futures. Catts suggests that the use of biological systems may "replace and seamlessly merge with human-made structures to the extent that cultural perceptions of what is alive and artificial will be redundant".

The idea of exploring biotechnology from an artistic perspective was first raised by Catts in his winning Honours project titled 'Living Tissue, Biotechnology and the Design Way: An Exploration of Issues Concerning Design and Technology'. The aim of this project was to see how a design profession at some stage in the future could be integrated with the development of

biotechnologically generated products, which are not of a medical or agricultural nature.

Catts suggests that from a design perspective, biotechnology can change the concept of products "from objects that have to be manufactured, to objects that can be grown".

The aim of the 'Tissue Culture & Art' project is to generate broader discussion concerning different aspects of human development and scientific progress, and the interaction of humans with the environment. The project has received \$30,000 from the New Media Arts Fund of the Australia Council for the Arts. Earlier this year the project also received \$4,500 from the Perth Institute of Contemporary Arts (PICA) Research & Development Fund for Multimedia and Hybrid Arts.

"The project will be a genuine attempt to raise different possibilities for the future as a basis for discussion about the ethics and values of manipulating living matter and incorporating it with non-living systems," Catts said.

"It will be free from scientific or commercial hidden agendas."

Obviously this type of project will raise philosophical and moral issues but Catts suggests that these issues will be dealt with and used as an "aspiration point" for freer documentation of the process.

The images, which are photographed through medical imaging, are constantly updated as the tissue grows and the pair hope to have a photographic exhibition of the works at PICA in the near future.

More information on the 'Tissue Culture & Art' project can be obtained from visiting the Web site at <http://www.curtin.edu.au/curtin/dept/design/tc&a/>.

Understanding is key to good Internet use

By Paul Gates

IT'S said that the key to any good relationship is communication — a key that may be becoming more elusive as the world becomes increasingly complex.

Social Sciences and Asian Languages lecturer Dr Matthew Allen, who is running a new unit next year dealing with humankind's interaction with the Internet, said the 21st century will present us with three communication modes.

"There will be face-to-face communication, written and computer-mediated communication," Allen said.

"To be efficient at work and to live full lives, people must be competent in all three."

The new unit, Internet 200/300, can be taken in the second or third year of study and is available as a cross-campus elective.

"I'm looking forward to getting people from social sciences, science, humanities and business together, to get their creative input on understanding the Internet," he said.

"People need to be educated to make informed judgements about how technology can change and influence their future."

The unit will look at the origins of the Internet, exploring for example the Internet's connection with the scientific community in America and the military given that the Internet was designed to be used as a communications tool during a nuclear war.

"We will then look at how the Internet has developed into a global utopian vision based on the notion of the perfect communication tool or, as others see it, the sign of a worrisome availability of information that no-one controls," he said.

"Researchers in America are developing a new more powerful Internet for university purposes, precisely because the Internet can't cope with the demands placed on it by other users."

Allen said the advent of the Internet had given a new twist to a range of work and social situations.

"One example would be the situation where employees 'steal time' at work to do private activities on the Internet; traditional power struggles between bosses and employers are now played out with reference to the Internet," he said.

Allen also cited the example of the media exploiting society's lack of knowledge of the Internet.

"Generally, stories about pornography peddling are run-of-the-mill, but as soon as the media puts the word Internet together with pornography it really catches attention, picking up on people's fears of developing technology."

Internet 200/300 is not designed to teach students how to surf the net and use email, but Allen said such skills were best taught by incorporating them into established units.

"All research on learning shows that if you want to teach people how to use a tool, it has to be intimately connected with a broader issue, and people will then be motivated to teach themselves."

He said a genuinely computer-literate person would have the skills to use a computer, as well as an understanding of the social and historical contexts of information technology.

"That is what Internet 200/300 offers and that sort of understanding only comes through actively looking for and developing one's knowledge, through an organised unit on present and past computer technology," he said.

"If students take something from this unit it will be that their job is to go out and use the Internet and learn. They need to look at developments and the impact of the new technology on their lives, so as to prepare themselves for the future."

He said units like Internet 200/300 would not tell people the future of Internet developments, but would give them the background, knowledge and understanding to determine the future by harnessing technology appropriately.

LAB NEWS

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There's quite an art to culturing skin

Understanding of scientific principles could well be more widespread, if the ideas of two Perth artists catch on.

Oron Catts and Ionat Zurr even put themselves through university courses in biotechnology and imaging, respectively, to produce what they believe to be a completely new art form using living skin tissue.

With a grant from the Australia Council, Oron has been growing fibroblast and epidermal cells over three-dimensional technological artefacts like cogwheels - with spectacular results. His

partner, Ionat, has documented the project with different imaging technologies like confocal and electron microscopy.

Oron said he hoped the work would highlight technological developments and generate discussion about their implications and ethics, free from scientific and commercial agendas, and create a dialogue between the wider community and the scientific community.

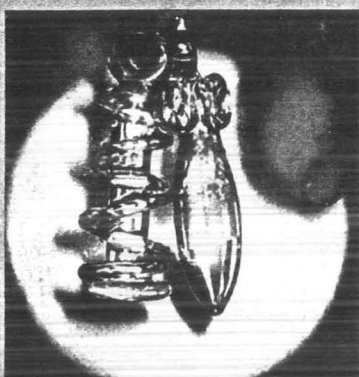
Despite his background in biology and recent training, Oron said he was not a scientist and was not trying to be one, but was convinced by the beauty and artistic value of science.

"I still don't understand it a hundred per cent," he said. "I'm doing the science according to protocols set by other scientists, not developing new media. We've just come up with a new concept."

Oron said scientists he had worked with at the Biomedical Research Centre at the University of WA were pleased to see the results.

"It's giving them a new perspective," he said. "They're happy to see their work as art."

The two artists will exhibit their work at Perth's Institute of Contemporary Art in September, but meanwhile the project can be viewed at www.curtin.edu.au/curtin/dept/design/tc&a



Tissue engineering ... cells on a glass bomb and spiral combine art and nature.

University crisis: FASTS lobbies government to devise strategy

Lobby group FASTS (Federation of Australian Scientific and Technological Societies) will host a one-day forum at the National Press Club this month to examine the crisis facing university science.

The forum will bring together groups from industry, government and the university sector to work on constructive solutions to changing expectations and shrinking resources experienced by university science departments.

The keynote speaker will be Professor John Niland, the new chair of the Australian Vice-Chancellors Committee (AVCC). The AVCC has also called on the government to investigate why students were moving away from science.

The crisis in Australian universities won the top spot in FASTS' annual "top 10" wish list forming its 1998 policies.

The group wants the government to resolve the funding crisis in universities before science departments are closed by universities forced into excessive cost-cutting measures.

HECS fees for science courses have nearly doubled since 1996, and FASTS has called on Science Minister John Moore to take up the issue of declining science enrolments with Education Minister David Kemp.

FASTS president Professor

Peter Cullen, said the issues raised in FASTS' top 10 policies for 1998 were so important, Prime Minister John Howard should step in to resolve them.

"There are so many areas that need attention - science and mathematics education in our primary and high schools, the low level of investment by industry in R&D, the lack of venture capital to turn good Australian ideas into commercial reality," Professor Cullen said.

"The Prime Minister has shown a refreshing personal commitment to the functioning of his Science, Engineering and Innovation Council (PMSEC) and to industry policy. We'd like him to take on some of the burning issues confronting science today."

The FASTS 1998 top 10 also calls for more industry-based R&D, better science education in schools, marketing of research, more awareness of the importance of science, encouragements for venture capital, improved job prospects for young scientists, and more funding to bodies like the Australian Research Council.

* *The FASTS Forum is on Wednesday, February 25 at the National Press Club in Canberra. For details, call Jan Thomas on (03) 9688 4401 or e-mail to JanThomas@VUT.edu.au*

Look out for Lab News' outlook on microscopy

Lab News has been named the official publication for Focus on Microscopy 98, an international conference to be held in Sydney in April.

Focus on Microscopy 98 is two conferences in one - the 11th International Conference on 3D Image Processing in Microscopy, and the 10th International Conference on Confocal Microscopy.

There is a scientific program with spoken and poster sessions, covering advances and applications of confocal microscopy, 3D imaging techniques in optical and electron microscopy, X-ray tomography, novel techniques, near-field microscopy, multiple photon microscopy, multi-dimensional image processing, and

applications of image analysis.

There is also a comprehensive program of short courses and workshops, a social program and an exhibition of the latest in microscopy products.

Over the next two months, Lab News will bring you an in-depth preview of Focus on Microscopy 98, with a special

conference edition in April featuring profiles of speakers, details of symposia, full coverage of exhibitors and a floor plan.

Call the editor for details on (02) 9422 2871, e-mail to iain.scott@reedbusiness.com.au, or call the conference organisers on (02) 9352 3178.



Howard to chair national science advisory council

o Australian science advisory bodies are to undergo major changes following recommendations made by the Chief Scientist, Professor John Stocker.

The Australian Science, Technology and Engineering Council (ASTEC) and the Prime Minister's Science and Engineering Council (PMSEC) will be dissolved to form a single advisory body after ASTEC's current inquiries are concluded.

The new body will be called the Prime Minister's Science, Engineering and Innovation Council (PMSEIC), and will be the Commonwealth government's principal source of advice on issues in science, engineering and technology, as well as related aspects of education and training.

PMSEIC will meet twice a year, chaired by the Prime Minister, to discuss national issues in science, engineering and technology. It will be given new powers to examine Australia's science and engineering capabilities, and the effectiveness of its organisation.

Prime Minister John Howard said the title of the new body recognised that innovation would be a key driver of competitiveness in the future.

"The emphasis of the new council reinforces the increasingly important role the government sees science and technology playing in Australia's future," he said.

ASTEC is currently investigating the effect of competition policy on research and development, and ethics and research in environmentally sensitive areas. It is expected to finish its investigations around May this year, after which it will be absorbed into the new body.

ASTEC was established in 1979 to provide independent advice to the Commonwealth government on a wide range of policies and programs related to science and technology, including advancement and development of science and innovation for national well-being, identification of new ideas in science and technology, and improving resources through science.

It is currently chaired by Professor Stocker and its 11 members include

Dr Elizabeth Heij (CSIRO Horticulture), Professor John de Laeter (Curtin University), Dr Carolyn Mountford (Institute for Magnetic Resonance Research) and Professor Lyn Beazley (University of WA).

It is not yet known what members of ASTEC will be retained by the new council. Mr Howard said the PMSEIC would retain the current membership of PMSEC, and would also include other key representatives of the business and science communities.

PMSEC is made up of the Prime Minister and seven government ministers whose portfolios cover science. Its current ex-officio membership includes Professor Stocker, Australian Academy of Science president Sir Gustav Nossal and CSIRO chairman Charles Allen.

In his 1997 report *Priority Matters*, Professor Stocker recommended changes to cross-portfolio advisory arrangements. Mr Howard said the government would respond to the balance of Professor Stocker's report "in the near future".

CSIRO invests in futuristic programs

Sale of CSIRO assets and savings within the organisation have led to the creation of new projects designed to show off the outcomes of CSIRO research.

The projects were chosen from 41 submitted by CSIRO scientists and sector advisory committees and include:

- a \$4.8 million investment to develop a solar/fossil fuel hybrid power generator twice as efficient as a coal-fired generator,
 - the development of a new generation of advanced indium phosphide integrated circuits, incorporating millimetre-wave electronics, photonics and digital circuits, for use in telecommunications and radioastronomy,
 - new designs for urban water systems to boost water saving, lower energy use and reduce adverse environmental impacts,
 - a project aimed at developing animal populations which can be farmed safely but which become sterile if they escape,
 - a nationwide bid to discover bioactive molecules for making better medicines, foods, industrial products and safe pest and disease control,
 - participation in international gene mapping projects in cereal crops, as well as mapping of Australian animals and plants, and
 - a bioinformatics project giving Australia access to global data about genes and biodiversity and use it to manage and benefit from global biological resources.
- CSIRO chief executive Dr Malcolm McIntosh said the special projects were chosen because they were at the cutting edge of knowledge in their various fields.
- "We called for the most imaginative and far-sighted proposals our scientists could come up with," he said. "Almost all were worth pursuing."

Don't underrate the audience for science

Another year, another FASTS top ten.

For years now, science lobbyists have had their wish lists to present to Australian science policymakers.

This year it's education's turn for the top spot, and with falling enrolments, soaring HECS fees and funding cutbacks in science education, it deserves the pole position.

Those of you for whom graduation is now a dim memory - you were lucky. Uni is a different place now to what it was when you were a sophomore. Words like "competitive" went unheard in those halcyon days, unless you combined your biology degree with an econ unit.

The audience at FASTS' seminar on the state of Australian science education later this month will be mostly made up of people in the firing line of universities' struggles - post-docs, educators and so on.

The sad thing is they've heard it all before, and it would be nice if there was more general interest in the forum - this is one issue all scientists should at least be aware of.

Another challenge scientists face, of course, is educating the general public about science.

For all science's fear about the public getting the wrong end of the stick about scientific developments - and we're all a little more wary of the applications of science since the development of the atomic bomb - there

has to be more openness when it comes to spreading the word about scary ideas like cloning.

And there's no reason why it shouldn't be through a popular medium like the visual arts, rather than a tabloid television show. From the first uses of pigment paint and clay to produce pictures and sculptures, to Leonardo da Vinci's sketches of flying machines, to British artist Damien Hirst's controversial cows-in-formaldehyde installations, art and science have always enjoyed a close relationship.

Forecasts tip that biotechnology will be one of the most lucrative areas of science by the turn of the century.

But you can bet those forecasts didn't include the possibility of artists like **Oron Catts** and **Jonat Zurr** (story page 1) whose biotechnology-based creations are arguably far more accessible than anything to come out of a lab.

To paraphrase English essayist Adam Phillips, thinking of science as unpopular knowledge diminishes both the audience and the knowledge.

IAIN SCOTT

* *Lab News* offers prizes to the writer of the best letter received for publication each month. Send your letter to The Editor, *Lab News*, Locked Bag 2999, Chatswood Delivery Centre, NSW 2067, or e-mail (plain text please, no attachments) to ian.scott@reedbusiness.com.au