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JULIE RYDER

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ABSTRACT

THE USE OF BACTERIA IN THE SURFACE DESIGN OF FABRIC: research into the growth and cellular structure of certain microorganisms to inform the images and colours used in a series of new textile designs. By using matter that has undergone the transformation from growth through to death, I intend to investigate and question the perception of beauty and perfection and their properties in visual art. I will explore the elements of control and order in textile design as opposed to random and incidental surface decoration on cloth. Finally I will use computer technology to explore new possibilities within my designs and have these original images digitally printed directly onto silk with reactive dyes.

A study taking the form of an exhibition of textiles exhibited at the Canberra School of Art Gallery from March 4 – 12, 2004 which comprises the outcome of the Studio Practice component, together with the Report which documents the nature of the course of study undertaken.

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INTRODUCTION

This report will present an overview of my project on the course of Master of Arts (Visual Arts) in Textiles. My project is to investigate the influence of bacteria and fungi in the colouration and surface decoration of fabrics.

This investigation will enhance and extend initial personal research on the effects of fruit fermentation on textiles undertaken since 1995. I have termed this process “nigredo” after a transformative phase that base matter went through in ancient alchemy. In the fruit fermentation method, various fruits and vegetables were placed directly onto silk and left to rot over several months, under strict environmental conditions. The rotting vegetable matter provided a food source for bacteria and fungi to colonise. Over time these colonies started to produce secretions which naturally dyed and stained the fabric. After several months these colonies dried up, leaving the dehydrated remains of the vegetable matter covered with spores. Once this detritus had been removed from the fabric images of the fruit remained fixed on the cloth even after it had been washed. Most of the colours produced were of a natural palette – beiges, browns, yellows, tans, greys and blacks, although some burgundy and pinks were often present. The vegetation which produced the most recognisable images were those from the citrus fruits, which left a circular imprint complete with recognisable segment and pip formation. This technique was therefore limited in the images and colours produced. I felt that further investigation into the isolation and cultivation of the microbes that produced these colours was needed in order to try to manipulate the surface decoration produced, rather than the random effects normally obtained. This is an exciting new area of research that could lead to an eco-friendly method of textile surface decoration in the future.

Two distinct methods of investigation will be undertaken during the course of the Masters program. Firstly, contact will be made with one of the Science Departments within ANU to ascertain the feasibility of growing specific microbes that will produce coloured images onto textiles. I envisage that the time taken to conduct these experiments will be minimised under laboratory conditions, rather than the several months it takes at present. Results of all laboratory tests will be documented and reported.

Secondly, microscopic views of these organisms will be used as visual references for textile designs that will be printed onto fabrics. I intend to learn a number of chemical treatments that can be applied to fabrics, such as discharge (bleaching), burn-out (devoré) and chemical resist using reactive dyes in order to extend my current repertoire of surface design and mark making onto fabrics. I intend to make contact with the Scanning Electron Microscopy Unit at the ANU in order to view organisms under higher magnification to provide extra visual elements for my designs. Light microscopy will also be utilised in conjunction with computer graphics to produce designs suitable for digital printing directly onto textiles.

Beauty will come in the dawn
And beauty will come with the sunlight.
Beauty will come to us from everywhere,
Where the heaven ends, where the sky ends.
Beauty will surround us. We walk in beauty.

Billy Yellow, Navajo Medicine Man, Monument Valley, Utah.

CHAPTER ONE - FLOWERS OF EVIL
SEMSTER ONE, 2002.

1.1 BACKGROUND

In 1995 I was shown a photocopy of an article written by Michele Fricke entitled "Tending a Cloth Garden"[1] which explored the work by Christopher Leitch and Stephanie Sabato. Operating under the name of Ganga Studio they collaborated on a number of art projects at the Kansas City Art Institute. One of these projects involved arranging foodstuff and flowers onto silk, thereby establishing an environment that encouraged the growth of moulds and bacteria. Leitch and Sabato likened this process to "gardening their cloth ".[2] The unpredictable results and the relinquishment of control are important aspects of this process to them. Leitch went on to utilise this process in many of his textiles, which were used mainly for clothing and accessories such as ties and scarves. His organic dyeworks evoke shadows and memories of transformative life processes.[3]

The photocopy was in black and white, the images barely discernible, yet the description of the work struck a strong chord within me. From 1978 – 1985 I worked at the Regional Veterinary Laboratory in Bairnsdale, Victoria, where I trained as a laboratory technician and Technical Officer, completing a Certificate of Applied Science part-time. Most of my time was spent in the Serology laboratory, Microbiology lab or the Post-mortem room collecting samples for analysis. It was in Microbiology that I learnt about the growth requirements necessary for different species of bacteria and moulds, as well as identification through testing, staining and microscopic examination.

From 1992 – 1998 I taught design and printing for textiles at Melbourne Institute of Textiles (now RMIT Textiles) in Victoria. Before reading the article about

Ganga, I had initiated a natural dyeing project with my second-year students. After reading the article we extended our initial research to include rotting different types of fruit and vegetables onto cloth in a restricted area of the campus. Our initial attempts did not deliver an aesthetic result, and the students who were involved became disenchanted with the process and the smelly outcome. However, my inquiring mind and prior scientific knowledge compelled me to keep experimenting, and I finally achieved the results I had hoped for. This led to over seven years of personal research into this technique, which I combined with other surface design techniques to produce fabrics for interiors and fashion accessories. **(Fig 1)** A desire to further this technique led me to enrol in Postgraduate study at the ANU.

1.2 EXPLORING THE SURFACE

In the first semester of the Masters program I focussed on learning experimental techniques of textile surface design that expressed the idea of decomposition and decay. Processes used to distress the fabrics were categorised into chemical, mechanical and biological methods. I explored the surface patination of objects that had aged and decayed, had been damaged and weather-beaten. I researched other textile artists who were using similar techniques and similar philosophies. I proceeded to look at the causes of deterioration and subsequent ageing of objects. I was also interested in what remained of an object once the majority of it had disintegrated.

There were two main categories that I felt contributed to the ageing of objects: nature and time. There are many factors in nature that can affect the surface patination of an object, such as light, moisture, temperature and bacterial and fungal infestation. Some conditions preserve whilst others aid natural decay and decomposition. Textiles rarely survive over a period of time, according to

Elizabeth Barber, unless they have been subjected to unusual circumstances, such as freezing or anti-aerobic waterlogging.[4] The act of ageing therefore implicates the notions of weather cycles and seasons, which in turn indicates time. Fabrics that have survived through centuries are usually very small fragments or threadbare pieces that give clues to their age by the analysis of fibre type and weave structure. These clues enable the archaeologist to determine whether the fibre is of plant or animal origin, whether it came from a wild or domesticated source, and, in the case of animals, from a male or female. In archaeological finds in the past, textile fragments which were wrapped around other objects, such as urns or pots, were not considered important and were usually discarded. Today, archaeologists realise that even one thread of a textile can offer important information regarding the lives and practices of our ancestors.

1.2 (i) The Stain

Worn, tattered and stained textiles hold a fascination for me because they retain clues to their previous history - secrets that can be unlocked with adequate knowledge. Although many of these textiles are usually only available to us through museum collections, or as images in books, we all have vivid memories of a favourite piece of clothing or fabric that can act as a signifier for a time and place in our own lives. Not only are such fabrics important but sometimes the stains on them are even more meaningful, and textile conservators will not remove the stains from fabrics that are significant in terms of historical context.

A famous example is the Shroud of Turin, which supposedly holds the captured image of the body of Christ within its fibres. (**Fig 2**)[5] The authenticity of the shroud has long been under review, and has been the subject of many books and articles published since its 'discovery' in France in 1355. Extensive study of the shroud (Sindonology) has revealed a handwoven linen cloth in 3/1 twill

(herringbone) which measures 12 ft by 2ft. The stains and marks visible on the shroud, either through positive or negative photography, show the life-sized image of a long-haired, bearded man with crossed hands together with various male human blood stains around it. In 1987 a section of the shroud was cut off for radioactive isotope carbon dating (C^{14}) performed by three separate laboratories. The shroud was unanimously dated between 1260 and 1390 AD, 'proving' it to be a medieval fake. However, subsequent microbiological evidence has been submitted showing that the fibres of the shroud are coated with a bioplastic material that could have increased the level of C^{14} in the sample, effectively dating it as younger than what it actually was. The bioplastic material accumulated from the symbiotic activity of millions of bluey green bacterial and pink pigmented fungi growing on the surface of the shroud. This contamination could have occurred through repeated human handling or from the physical effects of fire charring and water dousing that the shroud has been subjected to in the course of its history.[6]

Stains on cloth are indelible markers of time and place. They hold the clues for the identification of events and serve as remainders and reminders of what has transpired. The stain almost always has negative connotations – stained, marked, tainted, dirty and messy - that infers a variety of judgements about the owner – dirty, lazy, poor, careless, slob.[7] The world could be divided amongst those who throw away the stained object, those who keep them, and those who collect them.

Staining is also an important procedure in many routine scientific assays in histology, microbiology and haematology. The use of different stains enables us to differentiate microorganisms into different types and to see their shape and structures associated with them so that they can be identified.

1.2 (ii) Re-New

Why is it we hold on to worn and torn textiles in this modern consumerist society? Why do we appreciate the recycling efforts of other cultures, such as the *kantha* cloths from India, or the *saki-ori* weaving and *sashiko* stitching found in the fishermen's coats of Awaji in Japan. Both these cultures make an artform out of using worn-out fabrics combined with stitch to create new cloths. *The saki-ori* weaving **(Fig 3)** is produced by first unravelling the threads from old cloth and then re-weaving them into new durable work-garments such as coats, vests and trousers. Both *kantha* and *sashiko* cloths are made by sewing several layers of fabric together with decorative stitching. The *kantha* **(Fig 4)** uses a plain running stitch often changing colour throughout the textile, whilst *sashiko,* also seen in Fig 3, is traditionally stitched only in a white running stitch but in elaborate and decorative patterns over the indigo-dyed cloth.

I believe that these types of cloth retain a memory which hint at their past, an integrity which is rarely found in modern fabrics. I wanted to delve into the secrets of these cloths to try to produce modern textiles that evoked a concealed history. This brings up the important issue of reproductions and fakes, and the enormous amount of theory surrounding it. The trajectory of theoretical discourse surrounding this complex topic can be traced from Plato and Aristotle, to the Enlightenment thinkers such as Hume and Kant, and more recently to Danto, Deleuze and Baudrillard. Artists such as Duchamp (Readymades) and Warhol (the transformation of the familiar into icon) are often cited, along with contemporary artists such as Elaine Sturtevant, Mike Bidlo and Yasumasa Morimura. Fake, copy, reproduction, mimesis, simulacrum, representation, plagiarism, forgery, pastiche – the list of words used to describe such objects is endless, and each connotes a different meaning. The aspect of fakes that I was

interested in was using marks on fabrics as signifiers for emotionally charged events and memories.

I started to look at contemporary textile artists who attempt to bring a sense of history into their work. For British fashion designers Jessica Ogden and Russell Sage, this narrative is achieved in very different ways. Jamaican-born Ogden collects recycled and vintage clothing from charity shops that she pulls apart and reworks into new garments. By adding detailing such as hand-embroidery, screen-printing and applique she highlights the unusual cut and fabric combinations within the apparel. The sentiment of history is embedded in the antiquated and distressed fabrics. Ogden describes her clothes as being on a journey and having a life of their own – a past, present and future " I see the fabric I use as having already had a life…I am just continuing that life. You can read the history; the little pieces of embroidery, the mending, the caring they've received." [8]

In contrast Russell Sage prefers to enforce a new history on his clothing which is made from a fusion of vintage and modern fabrics. Once a garment is made, Sage then subjects it to a new experience – for example, by running over it with a car, throwing it from the window of a moving train, or jumping out of a plane wearing the garment – in order to emphasise the transitory nature of fashion. He makes a statement about the provenance of textiles by creating history with ordinary cloth.[9]

Since the late 1980's the German artist, Inken Waldsen, has been burying packages of cloth bundled together with scrap metal and soil in various locations throughout Japan, USA, Europe and Korea. **(Fig 5)** After six weeks she exhumes the fabric and mounts it onto paper for display. Organic shapes, rusting

edges, mud stains and insect damage pattern the resulting cloth.[10] Waldsen is a member of the Japanese-based Nature Art Network whose members use natural materials and processes to make their art. Like Ganga Design, they investigate the cycles of decay involved in the life-death cycle, which also monitors the cycle of time.

1.3 LOCATING BEAUTY

> ***"Beauty is no quality in things themselves; it exists merely in the mind which contemplates them; and each mind perceives a different beauty"***
> **David Hume (1711-1776) 'Of Tragedy'**

The ancient Greeks sought to rationalise beauty, and abstracted examples from nature to form a selective ideal, or "composite' of perfection. They measured beauty according to a set of values that included proportion, symmetry and order. Aristotle believed that a beautiful object must be evident to the eye and please it with a single glance. Aristotle wrote:

> *"A beautiful object, whether it be a living organism or any whole composed of parts, must not only have an orderly arrangement of parts, but must also be of a certain magnitude; for beauty depends on magnitude and order. Hence a very small animal organism cannot be beautiful: for the view of it is confused, the object being seen in an almost imperceptible moment of time. Nor, again, can one of vast size be beautiful: for as the eye cannot take it all in at once, the unity and sense of the whole is lost for the spectator, as for instance if there were one a thousand miles long."*[11] (Crawford in Kemal pp 185: Aristotle, Poetics 7, 1450b-1451a; trans . S.Butcher,

in Aristotle, On the Art of Poetry (Indianapolis; Hobbs-Merrill, Inc. Liberal Arts Press, 1956), pp.11-12

According to the Classical aesthetic then, my interest in the micro- and macroscopic views of living organisms could not be considered 'beautiful'. The ancient Greeks also associated beauty with goodness and considered it a virtue, rendering the absence of beauty (ugliness) akin to evil.[12] This viewpoint has been perpetuated from generation to generation to the present day through written and oral narrative and in particular through the use of film, especially directed at children. In many children's books and films, the hero or heroine is usually beautiful (and good and intelligent) and the antagonists are generally depicted with sharp, cruel features and unattractive physical attributes (and are either cunning or stupid). The exception to this is the Beast in 'Beauty and the Beast', but even he is transmogrified into a handsome prince in the end.

Like most adults I do not believe that beauty and goodness go hand-in-hand because life experiences dictate otherwise. We learn through experience that beautiful physical attributes do not necessarily equate with a person's capacity for goodness. However there have been many studies that prove that most humans are unconsciously susceptible to the power of physical beauty, often believing that those who possess it are more intelligent, good, kind, successful, honest, trustworthy, active, organised etc…the list goes on. The word 'beauty' is so all-encompassing and subjective that it has almost lost any real meaning for me. Yet I find myself using it on a daily basis, just as I used the word 'nice' in my primary-school days. Perhaps it is just laziness in relation to my vocabulary.

The Classical mathematical analysis of beauty was enthusiastically studied in the Renaissance, as can be seen in the works of Michelangelo and Da Vinci, and

continued right through history until the 17th century. At this point beauty was considered a subjective human experience that included sensations involving the heart, mind and soul of the viewer, and not depending on the outward physical appearance of the object itself. This philosophy opened up the idea of beauty to a variety of tastes and placed a high value on the spiritual and transcendental possibilities of art.[13]

In her essay “Beauty and its Dilemmas”[14] Olga Viso looks at the objectification of beauty throughout history and the pursuit for a “natural perfection”. She investigates the correlation between seduction and repulsion and the relationship between beauty and ugliness. She claims Lucien Freud’s use of paint and the handling of flesh in his ‘naked portraits’ “seduces the viewer with the lure of the grotesque”[15] much in the same way that people flock to the scene of a car accident. Taking this concept much further is the American artist Kiki Smith who finds beauty in the body’s ‘unseen and abject processes’.[16] Since the 1980’s she has attempted to de-eroticise the physical self through her investigation into individual body organs, systems and biological processes.

The idea of what is beautiful is also heavily dictated by cultural and social paradigms. This is clearly obvious when we look at the physical attributes that other cultures find beautiful or attractive. The heavily-ringed necks and legs of the Paduang Karen women; the bound feet of the Chinese women; the facial tattoos of the Maori women; and the elongated ear-lobes of the Masai and Dyak are examples of physical bodily changes for beautification or prestige. Fortunately for these women these practices are becoming outdated and only survive where the lure of money from tourists exists. However, the exoticism of the other has started to infiltrate Western society, influencing its tastes in terms of body adornment. Where tattoos, body piercing and scarification were once important

tribal customs, these procedures are now almost commonplace amongst the Western youth of today and possess little cultural meaning.

I started collecting photographs and pictures of objects in various stages of decay and deterioration such as rusty olive oil cans, the weather-beaten face of an old Japanese woman, a worn and battered felt hat. I wanted to collect all the things that to me seemed beautiful yet did not qualify as beautiful in the accepted sense of the word. Not only were these photos important as references for surface patination and design but I also intended to use them to build up a colour palette for my printed and dyed fabrics. **(Figs 6 & 7)**

Would stains from mould and bacteria be seen as 'beautiful'? If we look at Warhol's "Oxidation Painting" of 1978 **(Fig 8)** with no prior knowledge of its creation, we can begin to appreciate some 'beautiful' aspects about it. We can admire the patina and mark making which cover the entire surface; the subtle changes in colour and texture; the vibrant green centre with its darkened edges etc. However, if we knew that Warhol had in fact painted the canvas surface with metallic copper paint and then urinated onto it whilst the paint was still damp, would we still consider it 'beautiful'?

Perhaps there is a moral boundary that inhibits us from admitting the grotesque, the abnormal, the repulsive or the deformed into the accepted realm of beauty. To admit that one finds such an object 'beautiful' to others would open us up to ridicule, disbelief and suspicion.

American textile artist Anne Wilson's work both attracts and repels at the same time. She uses worn and threadbare domestic linen, such as handkerchiefs and

napkins, which she darns and embroiders with human hair. As Tim Porges remarks in his essay 'Specifics : Linen, Hair, the Closet and the Table',

> *"Where the weave is continuous but worn, the disrepair consists of blots of stitched hair that raise the surface into warty little islands of stubble."*[17]

At first sight these textiles look fragile, dainty and appealing but as closer inspection reveals the dark hair stitches one feels repulsed. Hair should not be there, on that pristine white cloth, on a dinner napkin, on that lacy handkerchief. These objects have become not just pieces of discarded fabric but **human**, familiar, intimate. Wilson's use of hair evokes feelings of ownership, memory and loss within the viewer; whilst at the same time feelings of repugnance and embarrassment prevail. In her work the hair on the fabric is either definitely not ours, or could be……..

It was at this point that I started to read Guy Sircello's book "A New Theory of Beauty".[18] Within the book he discusses a phenomenon known as "The Flowers of Evil" after Baudelaire's book of poetry "Les Fleurs du Mal" published in 1857. This title was actually coined by the novelist and critic Hippolyte Babou in 1855.[19] Baudelaire felt that Babou's oxymoron aptly described the antithesis of beauty and evil he aimed to invoke through his poetry. Baudelaire formulated that "Since every age and every people have had their own form of Beauty, we inevitably have ours".[20]

Sircello asserts that there can be properties of an object, beautiful in themselves, which can render the object ugly. For example, human faces bathed in a vivid green light will look ghoulish; red light will make them look evil. On the other hand there can be properties of an object, which are unbeautiful or disharmonious, yet, which render the primary object as beautiful. An example of

this could be looking at the patterns and colours found in bruises on human skin, or the vivid red blood that pours from a fresh gaping wound. On further investigation Sircello locates the source of "beauty" to be attributable not to the primary objects but the secondary ones – that is the *light* on the faces, the *blood* of the wound, the *colour* of the bruises. As Sircello states "beauty can bloom in the very anus of ugliness".[21]

This manner of looking at the beauty within objects also corresponds to the Japanese philosophy of *wabi-sabi*, the beauty of the ephemeral, the imperfect, and the unfinished. The closest similar Western adjective or concept would be "rustic", though this merely touches the scratches the surface of the true meaning of *wabi-sabi*. The phrase *"wabi-sabi"* comes from two distinct and different Japanese words. *Wabi*, which traditionally meant recluse, dispirited and morose; and *sabi* which meant sparse, deteriorated and wintry. However, since the late 14th Century, the self-imposed spartan and isolated life of the hermit was idealised by poets and philosophers as being the path to spiritual enrichment, where one could appreciate the minor details of everyday life and recognise beauty within the imperceptible and neglected aspects of nature. Although the words are often paired they still have independent meanings. Things that are *wabi* refer to the inner, the spiritual path of life and spatial events whilst those that are *sabi* refer to the outward, the objective, material objects including the arts, and temporal events. Together they encompass many concepts. Leonard Koren in his book "Wabi-sabi' lists some of these notions as:

Organic organisation of form (soft, vague shapes and edges)
Natural materials
Ostensibly crude
Accommodates to degradation and attrition
Corrosion and contamination make its expression richer
Generally dark and dim

One-of-a-kind/variable

Function and utility are not so important

Believes in the fundamental uncontrollability of nature[22]

On a metaphysical basis, all things *wabi-sabi* are devolving towards, or evolving from, nothingness. On a spiritual level there are three main lessons which have been learnt from observing nature: that all things are impermanent; that all things are imperfect; and that all things are incomplete. Where does the idea of beauty fit in here? As Koren states:

> *"Wabi-sabi suggests that beauty is a dynamic event that occurs between you and and something else. Beauty can spontaneously occur at any moment given the proper circumstances, context or point of view. Beauty is thus an altered state of consciousness, an extraordinary moment of poetry and grace."* [23]

1.4 STUDIO PRACTICE

When I think of art, I think of beauty. Beauty is the mystery of life. It is not in the eye, it is in the mind.

Agnes Martin. [24]

Throughout my career as a textile designer my inspirations have always stemmed from the things that immediately surround me, whether it be natural or man-made. I have always looked closely at my immediate environment in an abstract way to provide visual material for colour and texture. The things I find visually exciting range from the patina found on rusty metal tins, the layers found beneath the peeling paint on brick walls, dirty water marks on concrete barriers,

rusty nails in weathered paling fences and unusual stains and oil marks on pavements. I appreciate the conventional beauty found in cultivated flowers and planned gardens, but I walk away from them feeling like I've eaten a whole box of chocolates at once. This type of overt beauty bores me; I find it insubstantial, predictable and lacking in stimulation. Furthermore, the places where 'beauty' is found are usually crowded with people, and for me true beauty can only be discovered alone. As John Cage *stated "Beauty is now underfoot wherever we take the trouble to look."*[25] I much prefer to find my own version of beauty than have it ready made and presented to me. This perhaps gives a clue to my own nature as someone who likes the adventure of discovery, who takes time to notice things other people pass by, and who prefers to experience visual events rather than just see them.

The first project I set myself was to produce a reference book on surface patination that proffered a selection of photographs of objects that I found visually stimulating and 'beautiful'. Opposite each photograph was a range of the colours found within it, that I had matched and painted in gouache. I preferred to match and paint the colour chips myself rather than use ready-made samples as the process of matching and painting the gouache squares provided time to contemplate and consolidate my thoughts about the surface designs inspired by the photographs. It also gave me a clearer working insight into the way that colours were produced. This analysis of colour enabled me to comprise a colour palette for my printed and dyed textiles. Each photograph was window-mounted on heavy textured paper, as were the colour chips on the page opposite. I then made a hard cover for the book encased in matt black fabric and lined on the inside with hand-printed tapa cloth depicting one of my designs. I named the book "**flowers of evil**" after the phenomenon described by Baudelaire in the 18th century. The title was embossed into the cover of the book and became an invaluable resource for me later on in the semester. **(Figs 9 & 10)**

Using this book of images I started to explore different techniques in textile surface design that could imitate and evoke the surfaces of old and weathered objects. I searched for a simple motif that would embody the concept of degeneration, disintegration and decay that I could use to expose onto a photographic screen for printing. I resolved to use several hand-drawn images of leaves in various stages of deterioration. Although I was not completely happy with this as an image (simplistic, superficial) I felt that it had the greatest possibility in relation to the types of technical processes and colours I was exploring. I transferred these images onto a photographic silk screen in order to print a number of fabric samples using different chemical treatments.

I aimed to spend the first semester sampling and experimenting and was not overly concerned with producing finished pieces. I have grown comfortable with my working process now that I understand it. Reading and researching, sampling and experimenting often take up the greater proportion of my time. This time is invaluable because as I am going through the physical motions - repetitive tests and tasks to be fulfilled – I am subconsciously collating and distilling my thoughts about the finished body of work. When the testing period is over I then launch wholeheartedly into the production of the final pieces. This often happens within a relatively short space of time because I am very focussed and sure of what the work is about. It also means there is stronger continuity between pieces because they are made with a similar energy and thought pattern.

1.4 (i) Chemical Discharge

The first process I investigated was chemical discharge. This process involves using a print paste that contains an oxidising or reducing agent in order to bleach out a dischargeable dye from the background. Only certain classes of dye, and

sometimes only certain colours within these dye classes, are capable of being discharged. Extensive research undertaken by Annie Trevillian and Jill Pettifer from the Textiles Workshop at NITA in 1997 resulted in the publication of "Bleach, Buckle and Burn", a technical manual on chemical treatments for fabrics.[26] This, together with their personal input and advice, helped me to experiment on fabric using these methods. It had not been possible for me to practice these techniques before because they require rigid adherence to OH&S rules which, amongst other things, requires a steam room with adequate ventilation to the outside. The discharge process enables an uninterrupted full-colour background to coexist with full colour images in the foreground. Because the background is dyed first it gives greater design freedom with respect to colour. In typical screen-printing the background is usually the original colour of the fabric, or printed using colour separations and a clever repeat system.

In order to obtain more "natural" colours I dyed a number of silk samples with leaves and bark from various Eucalyptus species. The bark of the Argyle Apple (Eucalyptus cinerea) gave a particularly warm brown, whilst the leaves gave an orange-tan. Other eucalypts were the Iron-bark (Eucalyptus nubila), which gave a deep chocolate brown and the Stringybark (Eucalyptus baxteri). I was inspired to experiment with natural dyes by seeing India Flint's exhibition <u>'Shades of Eucalyptus'</u> at the National Botanic Gardens in Canberra in 2001.

Not all the naturally dyed fabrics discharged. The samples using silk organza worked the best, but as Annie Trevillian pointed out, the degumming process could have enhanced the removal of colour. Degumming is a process whereby the sericin on the organza is taken off by a strong alkali solution. The alkali present in the discharge solution was potash, and it was this, rather than the Discharge Liquid FD that removed the colour. **(Fig 11)**

1.4 (ii) Devore

The second process I tried was devore, or burn out. In this process a paste is applied to a fabric composed of different fibre classes – either in the warp or weft, or as a core-spun thread in both warp and weft. This process works on the principle that a strong alkali will burn out cellulose fibres, such as cotton or rayon, whilst protein or synthetic fibres will remain undamaged. In this way areas of a design can be etched out of the fabric leaving some areas transparent whilst others remain opaque. The most common combinations are silk/rayon velvet, where the warp is silk and the weft pile is rayon; and core-spun poly-cotton, where cotton is spun around a polyester core. I naturally-dyed some silk/rayon velvet, then printed the devore paste through a screen on the back of the fabric. **(Fig 12)** The paste is applied to the back of the fabric so that the caustic solution burns through the loops of rayon holding the together. A very poor result would occur if you tried to print onto the pile on the front of the cloth.

1.4 (iii) Grinding

In an attempt to create a more weathered look to some of my samples I decided to rub them with various types of stones to see what effect they had on the surface texture, inspired by the weaving of Chiyoko Tanaka from Japan. Tanaka is a weaver who considers the warp threads in her fabrics as markers of time. Not only does it take time to initially construct the cloth, she then "grinds" away with a stone on both sides of the fabric to reveal the hidden warp.[27] Subsequently she carefully rubs soil from a specific location into the cloth to add colour and texture. In this way, her weaving and the earth become bonded together. I ground several types of cloth with different sorts of rocks and pebbles. I altered the surface beneath the textile as well to see what effect this would have on the grinding. The best result I obtained was using a smooth river rock onto silk satin with a supporting surface of red brick. **(Fig 13)** As a practicing textile artist, I was

aware that the grinding away of fabric resulted in loss of strength within the fibres, and that this was not a desirable outcome if work was to be sold. I admired the way other textile artists had approached the problem of wanting a textile to look 'worn' and yet remain physically stable. One such artist is Liz Williamson, who scanned darned and torn fabrics into a computer and then re-wove the images using a computerised Jacquard loom. This process enabled her to articulate her ideas about the mending and darning of domestic textiles and did not impinge on the physical structure of the fabric itself. With my 'ground' silks I decided to bond them to a stronger base fabric of raw silk with double-sided fusing, and then used a seed stitch around the worn areas to not only highlight them but also to anchor them more firmly to their base. This gave the effect of a fragile fabric that had been lovingly darned without loss of tensile strength.

1.4 (iv) Burying

The next experiment I tried was to bury pieces of fabric within my garden compost. The first sample of cotton voile was dampened with water and then sprinkled with dirt from the compost. I sealed the whole lot inside a zip-lock plastic bag so that it would not get eaten away by worms, as had happened in the past. **(Fig 14)** The second sample was a silk jacquard approximately 50cm long that I also wet with water, then fan-folded between two rusty circular grates and sealed in a plastic zip-lock bag. Both samples were then buried under the compost so that light would not affect any of the processes. I decided to keep it there for at least four to five months before I dug it up. After this time the two samples looked suprisingly different. The first sample had started to disintegrate inside the plastic bag, and had predominantly dark stains produced by mould along with some bright pink crystalline-shaped markings. These I attributed to a type of "fluorescing" bacteria which had often appeared on my fabrics when soil or compost was involved. The regularity and symmetry of the forms was well defined and a perfect example of patterning within nature. The second textile

sample had faint rusty markings and small holes around where the grate had rusted the silk. As there was no soil or compost involved the rest of the silk was quite clean. Both of these samples provided an excellent surface on which to base a series of works for assessment

1.4 (v) Pojagi Masterclass with Chunghie Lee

In April I was fortunate enough to be selected to attend a Masterclass with Korean textile artist Chunghie Lee at the Textile Fibre Forum annual workshops in Mittagong. Chunghie's area of expertise is in *pojagi*, the traditional Korean wrapping cloth. She has mastered the conventional techniques and then adapted them to make contemporary textiles and clothing. **(Fig 15)** Traditionally *pojagi* or *chogakpo* (pieced wrapping cloths) were made from scraps of stiff ramie, hemp or organza. In this workshop I worked with piecing organza for the first time and particularly liked the way that the seams would stand out much darker than the transparent cloth pieces. The juxtaposition of opaque seams with the gauziness of the plain fabric in varying sizes reminded me of aerial views of agricultural landscapes.

The seams borne from the joining of two fabrics have always played an important role in my textile work. Traditionally fabrics are sewn together so that the joined seams lie on the inside of a garment or on the reverse of a hanging, away from the viewer. Many garments are then lined with a lighter fabric to either protect the seams from everyday wear or to protect the wearer from the roughness and bulk of the seams. In the case of quilts a layer of batting is placed between the top and bottom fabrics not only to add warmth but also to hide the seams from both sides.

My interest in using seams as a device for distinguishing the 'right' side from the 'wrong' side of a pieced cloth came from research into the philosophy of alchemy. The writings of Theophrastus Bombastus von Hohenheim (1493-1541), better known as Paracelsus, espoused his doctrine that the province of alchemy was not limited to the transmutation of metals, but encompassed the development of hidden possibilities or virtues in any substance, whether by God, or man, or Nature. These 'hidden possibilities' seemed to me to have a conspicuous parallel with fabric – seams, darns, invisible mending and patches. Why were they on the 'wrong' side of the cloth when they were often the most interesting aspects (to me) of the fabric? I began to show the seams to the front of my work and embellished them with stitching in order to emphasise them. Elements of design were hidden under other layers of fabric so that they would only become apparent to those who took the time to look for them. "*Seek, and ye shall find*" (New Testament, St. Matthew 7:7) These unexpected finds encouraged the viewer to not only appreciate the overall look of the textile but to look closer, to investigate.

At the time I was also intrigued in the Deconstruction mode of fashion, epitomised by the clothing of Martin Margiela of Belgium, one of the 'Belgian Six' along with Dirk Bikkembergs, Anne Demeulemeester and others. As a textile designer and printer in Melbourne I also worked closely with Denise Sprjynski and Peter Boyd, two of the original members of S!X, a Melbourne-based fashion label that specialised in the re-cycling and re-creating of existing garments into new ones. Exposed seams, frayed edges, applique and strategically placed prints were their signature look. Paradoxically, these criteria also applied to the African cloths I had collected many years ago. In particular the Bakuba or Kuba raffia cloth from Zaire exhibits opened seams to the front of the cloth. Once the cloth has been woven it is beaten with large mallets to flatten it even further so that it can be embroidered upon. At times this produces holes in the fabric, which are then stitched around and become part of the design element of the cloth.

The Kente cloth from Ghana is a narrow strip woven fabric approximately 10cm wide and two metres long which is then joined with other strips to form a larger cloth. The seams are sewn together with prominently large diagonal stitches so that they can be added to or taken apart easily.

1.4 (vi) Degumming

On my return to the Textiles Workshop, I dyed some silk organza with the natural dyes from the leaves and bark of the eucalypts. I then experimented with the "degumming" process. This technique involves applying a paste containing a strong alkali (potash or soda ash) to the dyed or undyed organza. The paste may be printed or painted on, depending on the desired effect. Once dry, the silk is steamed and then washed. The strong alkali paste removes the sericin (the silk protein) from the fibre where it was printed, leaving a soft and shiny area in contrast to the matt and stiff unprinted silk. **(Fig 16)** The paste also removes the colour from the fabric if it was dyed beforehand. If a white image is not desired, dye can be added into the mixture to give a coloured discharge known as illumination.

I was excited by the ethereal effect that this process had on the naturally dyed organza. The degummed sections of the decaying leaf image looked like ghostly apparitions. One day I misjudged either the amount of potash in my solution or the time taken for steaming by accident. The images only partially degummed so that they were barely discernible. Disappointed, I washed and dried the cloth and then printed a different design over the top of the previous one as I did not want to waste the silk. After steaming the sample again I ended up with the two images degummed at different strengths which looked even more interesting than my original plan. I then set out to exploit this technique in a number of long narrow cloths which I then cut up and pieced together pojagi-style.

1.4(vii) A Stitch in Time

Throughout the semester I had been attending computer classes with Sharon Boggon, so that I could simplify some of the labour-intensive techniques which I used in my work. For example, instead of stitching a whole piece of fabric to add texture and depth, I stitched a small piece of white silk with a black thread and scanned it into the computer. I could then manipulate this image using Photoshop in order to reproduce it, enlarge it, reduce it, or control it by re-shaping it. My objective was to produce a number of designs suitable for screen-printing. Once the photographic screens were made I could then play around with the combination of different images and repeats, as well as the type of print-pastes used through the screens to build up designs onto cloth. I used many of the techniques already described previously, and also printed with heat-sensitive inks that gave the "stitches" a three-dimensional form. In this way my "sewing" was done in under an hour from start to finish.

Designing using the computer was a challenge for me, as I had never used Photoshop before, and working with a mouse instead of a pencil seemed quite alien to me. I also had a tendency to 'think' like a screen-printer – that is, only in terms of black and white for images, and in separate layers in terms of colour separations. I could not grasp how I could convert full-colour designs from the computer to the silk-screen and therefore tended to resist exploration on this level. I persevered long enough in the first semester to produce a number of computer-generated digital images for screen-printing onto textiles, which I combined with the techniques I have already discussed.

1.5 ASSESSMENT

1.5 (i) Nature's Pojagi

'Nature's Pojagi' was a constructed textile made from naturally dyed organza that had been degummed and printed with reactive dyes, and heat-sensitive inks. The images used in the prints were the leaf motifs in various stages of decay, the digital images of the seed stitches in various formations and the circles which represented the microscope or petri dish that contained macroscopic views of xylem and phloem (plant cells). The dimensions of "Natures Pojagi" were 90cm wide and 180cm in length. The fabric appeared very airy and delicate in juxtaposition with the seams that created a darker grid-like structure to the whole. Personally, I didn't mind this dichotomy, however subsequent criticism was that the edges looked too hard and rigid for the softness of the fabric.

1.5 (ii) Decay Triptych

The Decay Triptych was a series of three curved textiles that attached to the wall. They each consisted of two layers of fabrics sewn together at the top to form a casing for the wire support that determined the curved shape. The top layer was made from naturally dyed and degummed organza. In the first textile, the printed image was of a healthy leaf; in the second a skeleton leaf, and in the third a series of "bacteria" and decayed fragments of leaf were all that were left. The bottom layer of each piece came from the experiments I had conducted with the fabrics I had put in the compost a few months earlier. The first textile had a silk which had been naturally discoloured by the dirt, overprinted with a variety of leaf shapes overlapping each other, in different hues of browns and greys. The second textile had the rusted jacquard silk as a base, which I had overprinted with "bacteria" in heat sensitive inks to form raised and three-dimensional images. The last textile was comprised of the disintegrated cotton voile fused

onto another layer of onion-dyed voile that had subsequently been printed with the microscopic images of plant cells and' bacteria'. The surface was further embellished with stitching using naturally dyed silk thread. With this triptych I tried to represent the process of decay and disintegration through colour, texture and image using as many of the processes I had investigated during the semester.

1.5(iii) Digital Devices

The final body of work produced for assessment consisted of a series of digital designs on paper and screen-printed images on fabric that had been embroidered into. I backed the paper images onto foam core and cut them to fit the 9cm diameter circular plastic petri dishes for display. The fabric prints were fused onto a backing of eucalyptus dyed wool batting and also cut to fit into the petri dishes. I also displayed the textile works in larger glass petri dishes of between 15 and 20cm diameter. There were approximately 30 petri dishes in total and these were displayed on a narrow table stacked on top of each other randomly. Although I liked the framing device provided by the petri dishes, the criticism I received was that the plastic detracted from the quality of the work and that glass would be better. Glass petri dishes are very hard to obtain these days as disposable plastic is thought to be more efficient and hygienic.

Fig 1 Detail of *Nigredo* silk fabric, 1995.

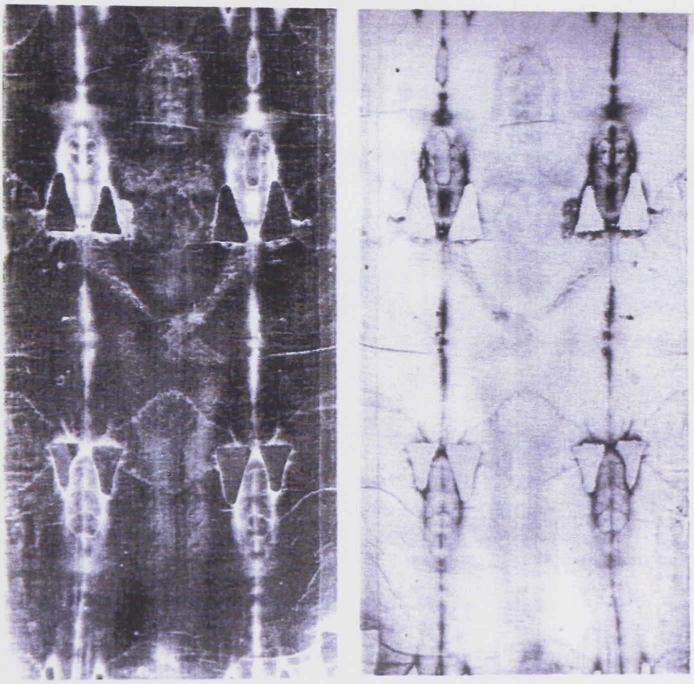


Fig 2 The Shroud seen full-length in a) negative and b) positive.

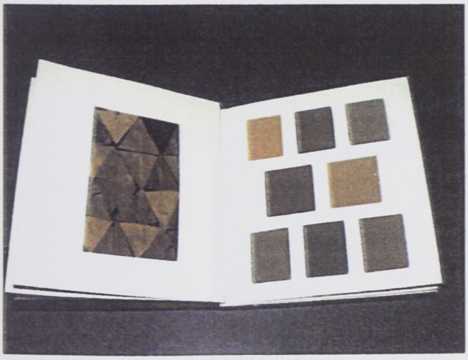
Fig 3 Japanese*Saki-ori* showing *sashiko* emboidery.

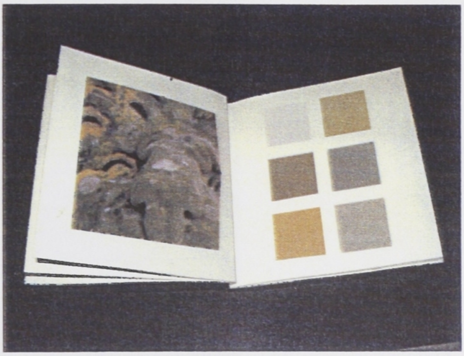
Fig 4 Indian *kantha* cloth

Fig 5.   Inken Waldsen. Detail of rust-stained fabric 1998

Fig 6& 7   Photos and collage used as inspiration for 'flowers of evil' book.

Fig 8 Andy Warhol, *Oxidation Painting, 1978.*





Figs 9 & 10 Views of *flowers of evil* book, showing inspirations and colour chips

Fig 11 Detail of Degummed silk organza, 2002

Fig 12 Detail of devore silk/rayon velvet, 2002

Fig 13 Detail of ‘grinded’ silk, 2002

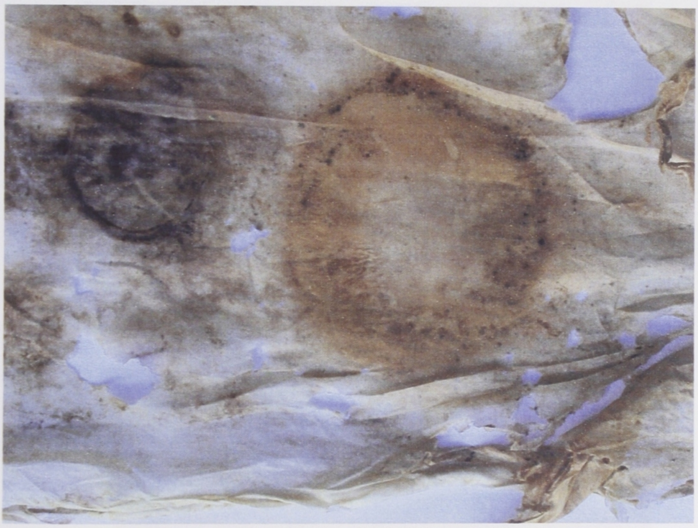


Fig 14 Detail of buried (and deteriorated) silk, 2002

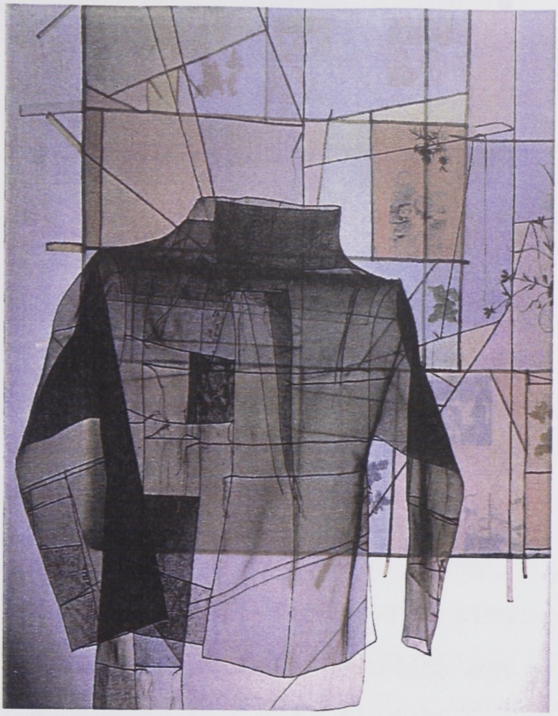


Fig15 Chunghie Lee, Pojagi shirt and hanging, 2000

Fig 16 Detail of degummed organza, 2002

So, naturalists observe, a flea
Hath smaller fleas that on him prey;
And these smaller still to bite ‘em
And so to proceed ad infinitum.

Jonathan Swift.

CHAPTER 2 - BIOTA
SEMESTER 2, 2002

2.1 BACKGROUND

At the end of the previous semester I made contact with Dr David Gordon, from the Department of Biology and Zoology at the ANU. **(Fig 17)** At our first meeting I had shown him some samples of 'nigredo' fabrics and discussed the possibility of isolating and growing specific bacteria or moulds for colour on fabric. It was agreed that I could use the laboratory facilities under supervision for this purpose. This would be included in the three units of Studio Practice for which I had enrolled that semester. I was also enrolled in the first of two Core Theory Units - Points of View: Readings in Contemporary Criticism - with Helen Ennis and Gordon Bull.

2.2 BENEATH THE SURFACE

I was keen to investigate whether any research had already been carried out on colours produced by specific bacteria or fungi onto fabric. I asked for advice from Carol Cain who worked at the National Gallery of Australia and who was a qualified conservator. She suggested I look through the Art and Archaeology Technical Abstracts (AATA) that were held at the National Gallery library. Starting at 1974 and going through to 2000 I found that most of the abstracts dealt with issues surrounding the conservation, protection and cleaning of fabrics which had been infested by mildew, and little or no research had been done on the colours these microorganisms produced. I came to the realisation that the processes I used on fabric were perhaps considered 'anti-conservation'! The other similarity amongst the abstracts was that the most common fabric investigated was cotton,

not silk (as in my case) and that many of the studies were undertaken in tropical climates where mildew is prevalent.

Using the ANU library catalogue database in conjunction with the internet provided a few germane articles about biotechnological processes on textiles. A paper entitled "Biotechnology in Textiles" by Chris Byrne of David Rigby Associates in the U.K. was presented to the Textile Institute's Dyeing and Finishing Group Conference in Nottingham in November 1995.[28] In this paper Byrne outlines the uses of biotechnology in the production and manufacture of textiles, from colouration through to genetic engineering. With reference to the colouration of fabrics Byrne states "...that certain microfungi are capable of yielding up to 30% of their biomass as pigment."[29] Byrne estimated that the research and development of fungal pigments for textiles would not be completed before 2005.

More recently Phil Shaw, a lecturer and printmaker from Middlesex University, School of Art and Design, has researched into the use of phytochromography, or screen-printing onto paper with natural dyes from plants. His doubts about the so-called "water-based" screen-printing inks currently available prompted him to develop a series of natural 'process-colours' (i.e. cyan, magenta, yellow and black) and a thickener that are derived from vegetable sources.[30] The four colours that he had most success with were woad (cyan), pokeweed (magenta) weld (yellow) and oak galls with ferrous sulfate (black). Although there are issues with light-fastness he is optimistic that further research will overcome these problems. The Auro Corporation of Germany is already producing a range of vegetable paints at a reasonable cost and Shaw feels that the commercial possibilities of producing natural printing inks for fine-art print-making will soon be viable.

Through research and development on monoclonal antibodies (protein molecules that have the ability to 'recognise' specific substances in low concentrations), Biocode, a York-based company, has developed a sensitive marking tool for the prevention of counterfeiting. The markers themselves can be applied to foodstuffs, drinks and textiles and are cheap and safe substances to use. By binding themselves to a marker molecule, the selected monoclonal antibodies produce a readily visible colour change that can be detected easily by customs or trading inspectors. This technology has already been used in the marking of branded denims, and can be applied to other surfaces via ink-jet printers. [31]

In 2002 researchers in the USA re-engineered the genetic make-up of E.coli, an intestinal bacterium, so that it produced an indigo dye. According to the Journal of Industrial Microbiology & Biotechnology the denim industry consumes approximately 16,000 tons of synthetic indigo obtained from mineral oil, thereby producing toxic waste. The microbes, however, produce sugar-based indigo and far fewer waste products, although this process is not yet commercially viable due to production costs. Scientists are hoping to increase the productivity of the bacteria in order to counteract this.[32]

2.3 POINTS OF VIEW

The first compulsory theory unit, 'Points of View: Readings in Contemporary Criticism', was taken by Helen Ennis and Gordon Bull from the Art Theory Department, NITA. Concurrently, I voluntarily audited a lecture series given by Robyn Maxwell from the Art History and Visual Studies Department at ANU, entitled "The Fabric of Life".

2.3(i) Royal Africa : Kings and Chiefs

The first essay of 2,000 words was in the form of an exhibition review. I elected to write about 'Royal Africa: Kings and Chiefs' – an exhibition of African artefacts from the NGA's own collection which was held from 3rd August 2002 – 12 January 2003 at the National Gallery of Australia. This was a small exhibition of about 30 objects that were made in and for the royal courts of West and Central Africa in the last 600 years.

I chose to review this particular exhibition because it had a large focus on textiles typical of many that are in my own humble collection. It displayed an extensive array of textile craftsmanship by both men and women that informed the viewer not only about the division of labour amongst the king's subjects but also about the role craftsmen played in the dispersion of information from one generation to the next.

As fabric surface design has become increasingly digitised for economic reasons, many cultures are now losing the interest and impetus to produce their traditional cloths such as the embroidered raffia cloths of the Kuba people of Zaire. I believe that cloths such as these retain value for many people, not only those of that community. Firstly, the local community holds them in esteem as sacred, ritualistic cloths used for ceremonial or cloth exchange purposes. Secondly, those outside that culture are reminded of old ways, memories and the passing of time. Hand-made cloth still has value on an emotional level to many people in today's highly mechanised society.

2.3 (ii) Southeast Asian Textiles in the Collection of the NGA.

My second essay of 5,000 words explored the reasons why the art of Southeast Asia had become more prominent in the Australian artworld over the last decade, with particular reference to the textile collection in the NGA. I was privileged to audit Robyn Maxwell's lecture series 'The Fabric of Life' and became extremely interested in the textile techniques practised by many of the cultures located in South East Asia. As Robyn's extensive knowledge of textiles, tradition and ritual permeated through her lectures I became curious about the politics of collecting textiles from other cultures. My essay focussed on the collection of the Southeast Asian textiles in the NGA, which to date is one of the best in the world.

From my research it became clear that politics, either in Australia or in a Southeast Asian country, had an enormous influence on the way this art was collected and why it was collected. Public galleries such as the NGA play an important role in the preservation of artistic traditions from countries that are under threat from war or social turmoil. By analysing the NGA Annual Reports from 1976 to 2001, I found that there was a direct influence on the number of textiles collected and the positions held by the Director and Curator. Since Robyn Maxwell has held the position of Curator of Asian Art, over a thousand SE Asian Textiles have been collected by the NGA, including the donation of over 397 textiles from the Holmgren-Spertus collection alone. This collection was entrusted to the NGA from the American collection *because* Robyn Maxwell was the Curator, emphasising that the curator is the pivotal pin in the strength of the collection as a whole.

2.4 STITCHING GENES

Another project I began using the computer revolved around scanning existing 'nigredo' fabrics into Photoshop and combining them with my 'stitches'. I played around with these images for a while and realised that my 'stitches' started to look like 'chromosomes '. I started to manipulate the motifs so that they "paired off" like chromosomes, and altered their colour and texture to create interesting effects. Using a circular template that referenced the petri dishes used to grow bacteria in the laboratory, I designed a series of twelve images that narrated the life, growth and eventual decay of these 'chromosomes'. **(Fig 18)** I transferred these images onto thermal heat transfer paper that were subsequently sublimated onto silk organza using the heat transfer press.

Other motifs used within my printed textiles were images of cloth viewed under the microscope; clusters of mono-printed dots of varying sizes and textures to represent cocci and other microbes; and the positive and negative use of the circle – both as a resisted shape and a positive print, which will be explored in depth later in this report.

2.4 (i) The Circle

All things from eternity are of like forms and come around in a circle.

Marcus Aurelius Antoninius (121-180)

I explored the symbol of the circle, primarily because I was working with this shape in the form of petri dishes over at the laboratory, but also interested in investigating its spiritual and aesthetic significance in art throughout history. The circle or sphere is symbolic of unity. According to Dr M-L. von Franz the circle or sphere is a symbol of the self that expresses the totality of the psyche in all its

aspects.[33] In many eastern religions the circle (or mandala) encompasses the four cardinal points which relate to the four functions of consciousness – thought, feeling, intuition and sensation, as described by Carl Jung.[34] For Jung mandalas have to be round because they symbolise the inner life of a person, which is a microcosm – a small universe in itself. In Zen Buddhism it represents enlightenment and human perfection. In non-Christian art, such as rock paintings and engravings, the circle can be seen as a "sun-wheel" whilst in Christian art it appears in the form of halos around the heads of Christ and the saints.

I used the circle as a symbol of the spherical nature of life itself, not only just the life-death cycle but the way that energy flows around and through it - "what goes around, comes around". This maxim has been true enough in my own life and I believe that nothing we do is a waste of time or energy – it all ends up happening for a reason whether we realise it or not. Atomic particles, atoms and molecules are all depicted as circular elements. When you look down the microscope the field of view is circular. It never stops amazing me that the largest thing we have (the earth) is a sphere and so are the smallest things (atoms), and this is what inspires me to look at both the micro- and the macroscopic views of matter.

2.5 STUDENT EXCHANGE AT KYOTO-SEIKA UNIVERSITY

In September 2002 I was fortunate enough to be included in the ANU-Kyoto-Seika University student exchange trip to Japan. The group comprised about 17 students and 4 lecturers from all workshops within NITA. Traditionally all students take one of two workshops offered at Kyoto-Seika University. In 2002 these were Ceramics and Paper making/Woodblock printing. As there were five textiles students on the trip, and the other workshops were full, we were given the opportunity to devise our own textile-related tour of Kyoto as well as attend a three-day *katazome* (resist-paste dyeing) workshop with Shuji Asada, the Head

of the Textiles Department at Kyoto-Seika. We also held an exhibition of our work at Gallery Fleur entitled 'Canberra-Kyoto', which was well received.

This trip was an amazing experience for me as I had been studying the techniques of many Japanese artists prior to the tour, and had been using Japanese silks in my work for many years. I was able to see the contemporary work of Chiyoko Tanaka, Masashi Honda, Reiko Sudo, Jurgen Lehl, Hiroyuki Shindo, and many others in galleries such as GalleryGallery and department stores such as Takashimaya. However, the biggest impact on me was going to the cultural museums and villages to see ancient techniques up close, such as the *saki-ori* weaving, *sashiko* as well as silk weaving, dyeing and painting.

Another major influence on my work was going to the studio of the Utsuki family, the Master Indigo Dyers, at their 'Aizenkobo' workshop. Situated in the Nishijin area of Kyoto, Aizenkobo follows traditional techniques using the *tade* or knotweed plant indigenous to Japan. This produces the deep, rich eggplant blue for which Japanese indigo is famous. At Aizenkobo the indigo vats are a combination of ground fermented indigo leaves; lye; lime to control the fermentation; and wheat bran to nourish the bacteria needed so the oxygen from the indigo solution will dissolve and be absorbed by the fabric or fibres. The vat is kept heated to maintain a state of fermentation. The fermentation process using natural bacteria often takes up to three weeks to mature. Several vats are kept in varying stages of fermentation to ensure that one is always ready for use.

The *kata-zome* workshop with sensei Asada-san was undertaken in the Kyoto-Seika textiles workshop. Firstly we had to design a pattern measuring 34 x 34cm – the size of our finished silk squares. The negative areas of the design were then filled in with black ink. Using a sheet of Japanese stencil paper, the design

was transferred and then the positive areas cut out with very fine and sharp scalpels. Traditionally this stencil paper was reinforced with persimmon juice and then smoked for one week, however now a commercial paper that is even more resistant to buckling under damp conditions is available. It was encouraged to use a new blade every 20 minutes or so. Once the design had been cut out, a dye resistant paste was applied through the stencil onto the fabric. This was then sprinkled with sawdust to aid drying and the whole silk square was stretched from the back using long bamboo skewers with pins at each end. This enabled the designs to dry slowly but naturally so the resist paste did not crack. In the past Soya-bean milk (protein) was then painted over the back of the design once it had dried to act as a fixative, however we used a commercial paste. The acid-dyes could then be painted over the fabric carefully but rapidly using a variety of brushes to ensure an even coverage. Once dry, the fabrics were steamed for 45 minutes to fix the dyes.

I was especially influenced by this workshop because of the use of simple stencils that are often dismissed as 'unprofessional' by (western) screen-printers. The use of photographic screens for printing designs is often taken for granted and I resolved to include more paper stencils in conjunction with my photographic designs to enable greater design freedom within my fabrics. In this way screens could be used in a variety of ways and both positive and negative stencils could be used to mark off areas or for direct printing. I was particularly impressed with the tools available for very fine stencil work, such as the implements used to create small, sharp circles within the stencil. By observing traditional and contemporary Japanese designs I discovered that the patterns that appealed to me had simplicity of style, rhythm, and space and relied on elements inspired by nature. My finished design for the Kyoto workshop was therefore composed of large subdivided circles that were surrounded by smaller and smaller circles.

2.6 BIOTA FOREST

Occasionally I start out on paper with a drawing. But more often than not I start with the fabrics and the printing techniques themselves. You know right away whether the idea will hold, whether you have the prerequisites for the experiment. Sometimes, though, I'll end up going back to paper and drawing. But above all, my work is developing the textile, and the intriguing thing for me is the boundless possibilities of texture.

Thea Bjerg[35]

Returning from Japan I became very focussed in my ideas for a body of work for assessment and its presentation. In order to generate an ethereal presence with my textiles I decided to print a large number of narrow lengths of fabric (approximate widths between 38 and 90cm and lengths between 110 and 120cm). Some of the printed fabrics were made from silk organza whilst others were made from semi-opaque Japanese kimono silks, often with an existing Jacquard pattern woven into them.

The '**flowers of evil'** resource book I had made inspired the colour palette; hence many of the fabrics were naturally dyed before printing. A combination of surface design techniques were used including discharge printing, direct dye printing, polychromatic, resist printing, heat sublimation printing and printing with heat-sensitive inks. Although the fabrics had had a variety of complex treatments, the overall designs were uncluttered and calm. Each of the 18 fabrics was individual in design and motif, scale and placement but was unified by theme and colour. **(Figs 19 & 20)** Some of the cloths were also embellished with seed stitching in naturally dyed silk so that it was only discernible up close or with a light source behind it.

The works were hung in three horizontal rows that were two metres apart in the Foyer Gallery of NITA, so that natural light could pass through the fabrics, highlighting their transparency and apparent fragility. **(Fig 21)** The spacing between the pieces in each row varied so that fabrics from subsequent rows could be seen through the gaps, whilst others visually overlapped, forming new images. The idea for this presentation came from walking through giant bamboo forests of Kyoto in the early misty morning – a naturally liminal space where time seemed to stand still. The wooden floor below added harmonious warmth to the overall effect.

On the wall to the left of the installation I had pinned 28 organza squares that measured approximately 10cm x 10cm. These pieces had been placed in petri dishes containing a variety of different agars with slices of citrus fruits and had been left to grow at room temperature for several weeks. **(Figs 22, 23, 24 & 25)** On the opposite wall I had a series of mounted colour prints narrating the digital design work involved in the life and death of my 'chromosomes' as well as digital photographs of moulds and bacteria growing on my fabrics in the laboratory. These were complemented by a series of four textile samples that showed the presence of colour produced by the microbes onto both silk and cotton.

The overall effect of the installation was placid and peaceful, a place for contemplation or meditation. The organza pieces were not hemmed at either the bottom edge or the selvedges, so that the effect was diaphanous and uninterrupted by harsh edges. At first I had a problem with the concept that the edges would fray, but I reasoned that this aspect was also an important element within the total concept surrounding the work.

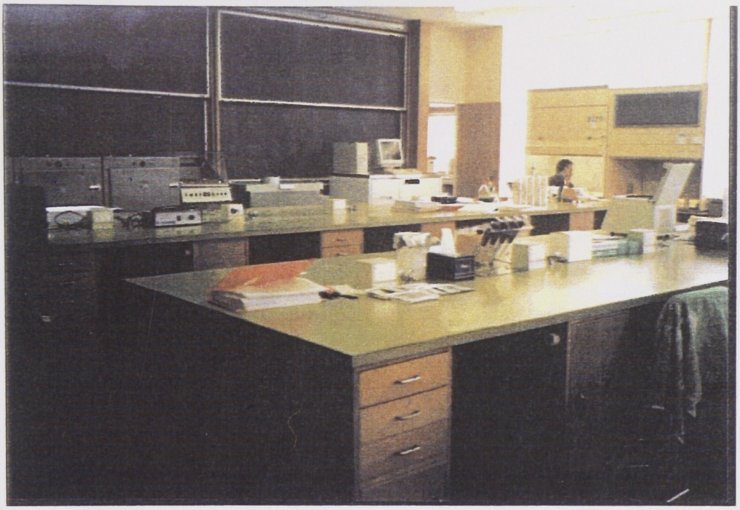


Fig 17 Dr David Gordon in his lab at Botany and Zoology, ANU

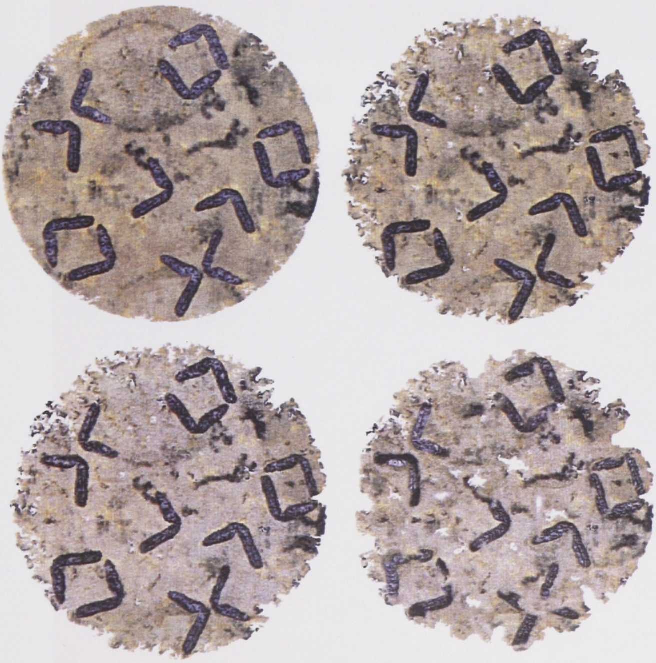


Fig 18 Details of my digital 'chromosomes', 2002

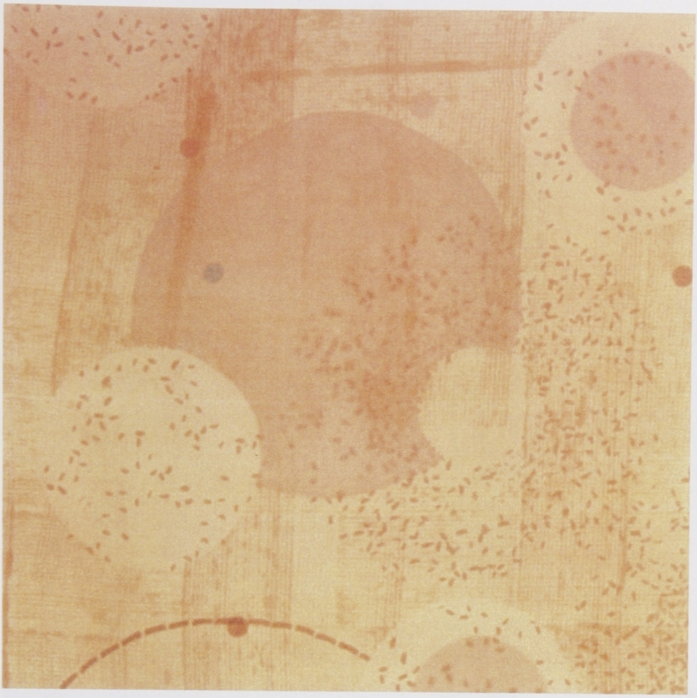


Fig 19 Detail of *Biota #5*, 2002

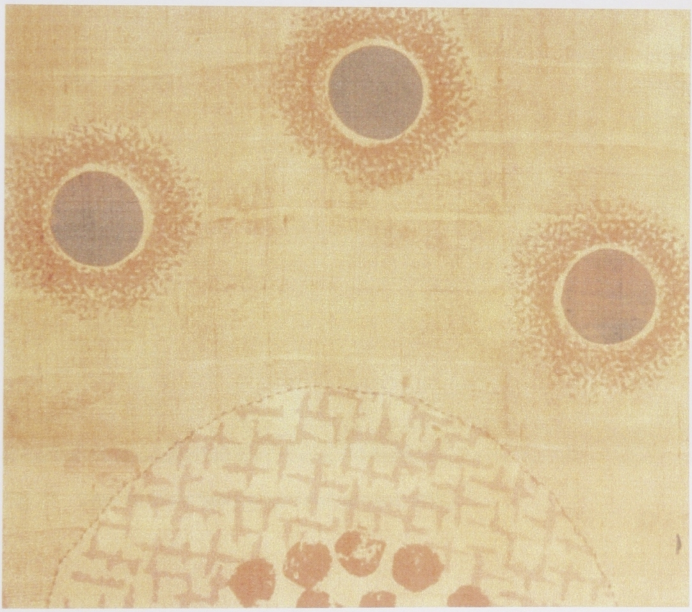


Fig 20 Detail of *Biota #8*, 2002

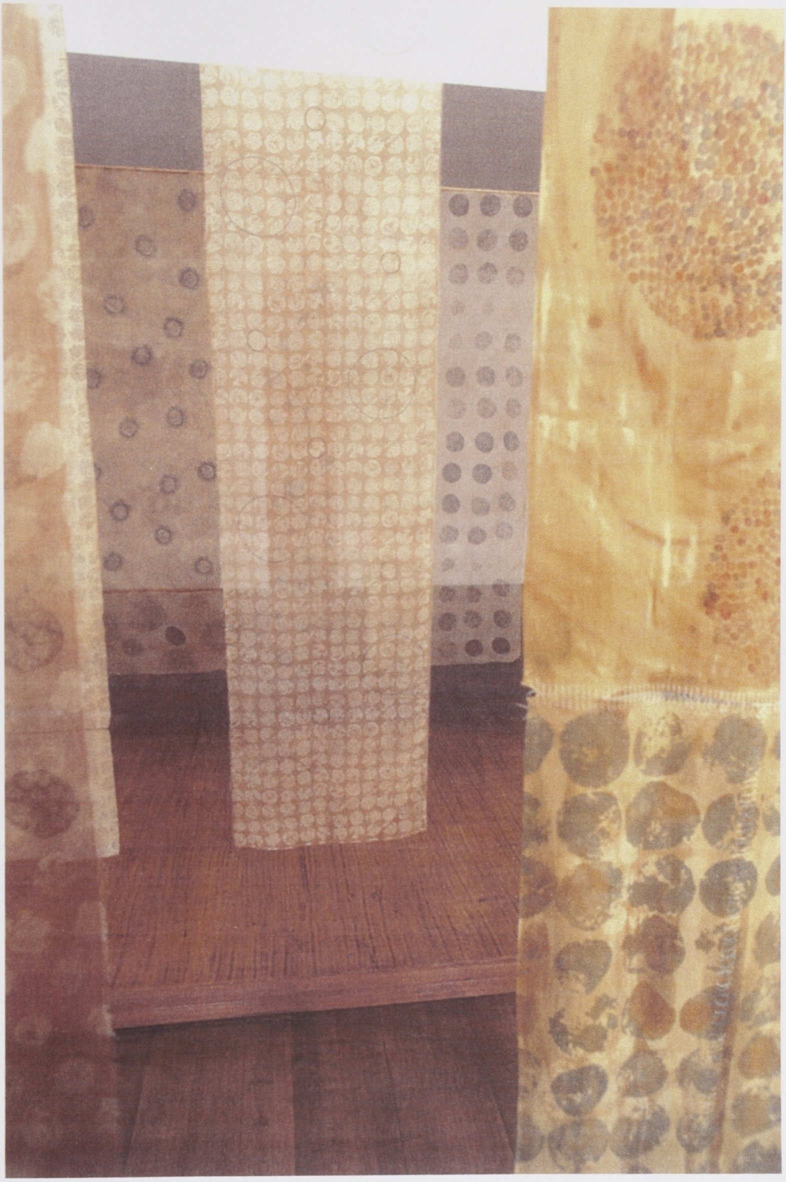


Fig 21 View of *biota* fabrics for assessment, 2002

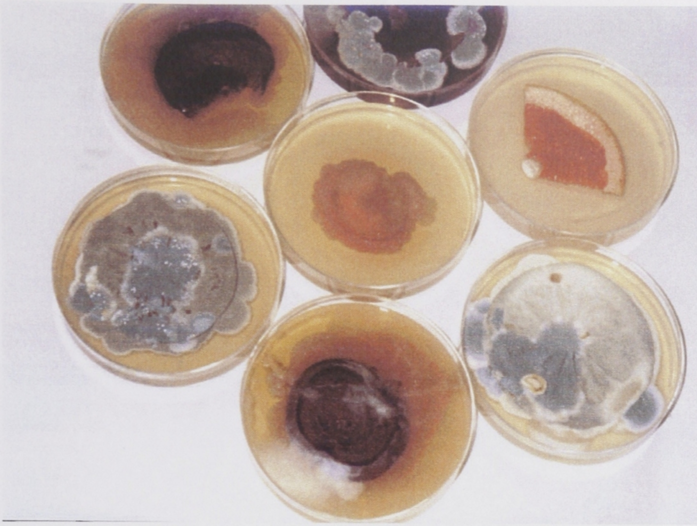


Fig 22 Petri dishes containing agar and slices of vegetables and fruits

Fig 23 Stacks of petri dishes containing five different types of agar

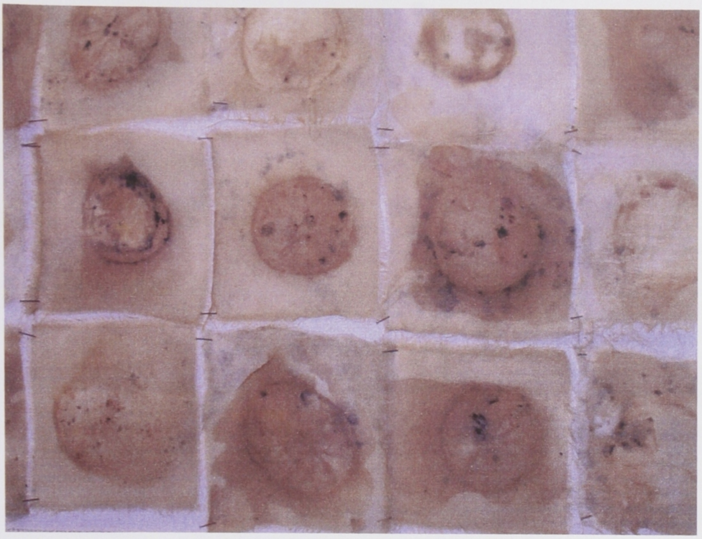


Fig 24 Detail of fruit fermented organza squares, 2002

Fig 25 Detail of organza squares used in Fabric length, 2003

'The dreamer no longer dreams images, he dreams materials.'

Gaston Bachelard

CHAPTER THREE - CHROMOPHILIA

SEMESTER ONE, 2003

3.1 BACKGROUND

The starting point for this semester's work came from the results produced in the Botany and Zoology laboratory the previous semester. I had managed to culture a strain of bacteria *Serratia marcescens* that I transferred onto fabric samples in various patterns. **(Fig 19)** The resulting bright pink designs inspired me to wonder if other basic colours could be obtained from bacteria for use on fabric. Unfortunately Dr Gordon did not have any strains which were safe for me to use, although he did know of bacteria which produced yellow and blue pigmentation. Disappointed, I started to think more about the actual structure of the microorganisms I was using, and asked if he could refer me to someone who worked in scanning electron microscopy (SEM). He directed me to Dr Roger Heady from the Research School for Biological Sciences (RSBS).

I also relied heavily on my *own* interpretations of cells, bacteria and fungi through drawings and monoprints, which helped me initiate designs for printing. In my studio practice I researched methods of printing full colour backgrounds and coloured foregrounds *without* using colour separations or super opaque pigments, which sit on top of the fabric surface.

I completed my last compulsory unit of theory with Gordon Bull and Jo Diamond, from the Centre for Cross-Cultural Research Studies at ANU, entitled "Arguing Objects: Looking at Art, Craft and Design".

3.2 ARGUING OBJECTS: LOOKING AT ART, CRAFT AND DESIGN.

Assessment for this unit comprised a 2,000-word essay skeleton with a presentation to the group, followed by submission of a 4,000-word essay on an object you had selected from a public collection. I chose to write about an object that was not on public display, but found in the National Museum of Australia's repository at Mitchell. The object was a corset (1920-1930) and I selected it carefully for a variety of reasons. The history of corsets at the time of British invasion and colonisation of Australia; the effect it had on both European and Aboriginal women; and its development into one of the most powerful political symbols for feminists the world over provided me with enough material for an interesting and pertinent essay.

I argued that whilst many white women were liberated from the use of the corset by the invention of the bra, Aboriginal women became more oppressed. They were forced to adopt European clothing along with Christian ideals of morality, cleanliness and decency. The role of Aboriginal women within both black and white societies diminished under physical, emotional, sexual and cultural oppression and I opined that the corset/bra could be seen as a symbol of this treatment.

The other fascinating aspect about this object was its physical location within the NMA (hidden away in the Repository) and the parallel this had with its use as an undergarment. I discussed issues relating to the private and public through the corset/bra as well as its use in contemporary art and fashion to make political and social statements, from both Aboriginal and non-aboriginal perspectives.

Although this essay had little in common with my practical and theoretical investigations it provided an opportunity to research into issues I was deeply interested in.

3.3 FUNGAL SEMINAR WITH MARY-LOU FLORIAN

In May I attended a one-day seminar at the Powerhouse Museum in Sydney for professionals involved in preservation and heritage management. "Fungal Facts – Solving Fungal Problems in Heritage Collections" was presented by Mary-Lou Florian, a mycologist from Canada, who refers to herself as "Miss Mould". Dr Florian is a Research Associate, Emerita, at the Royal British Columbia Museum, and retired as Head of Conservation Science in 1991. This was an extremely informative seminar dealing with the life cycles of common fungi from the Kingdom Eumycota that could damage heritage collections. We particularly focussed on the class Ascomycetes that includes the genii Aspergillus, Penicillium and Eurotium, and Dr Florian's speciality – slime moulds. Many of these fungi had been found growing on my fermentation fabrics, and so I was eager to learn more about them. The majority of participants were keen to find out how to remove and destroy these fungi, whilst I was hoping for tips on how to encourage them to grow! I felt very "anti-conservation" especially after talking to Dr Florian about my work, which she found highly amusing. Nevertheless, it was well worth my while to attend the conference to learn more about fungal growth cycles and the detrimental effects they can have on fabric, paper and even human health.

3.4 STUDIO PRACTICE

3.4 (i) Monoprints

The drawings resulted from an effort to produce drawings which were simple reflections of the means, whether it be pencil, charcoal or pen – the traditional mediums associated with drawing. What I was striving for was a quality of mark which would simply express those means.

Robert Macpherson [36]

I had been looking at various scientific books on botany, cell structure of both plant and animal cells, as well as electron microscopy of bacteria and fungi. I initially started to draw what I saw, using my own marks to interpret the lines and textures before me. After several pages of drawings I realised that my work was becoming very "tight" and orderly, reminiscent of scientific illustration, and had lost some of its usual spontaneity and expressiveness. I revisited books on the work of Cy Twombly and Robert Macpherson whose work exhilarates and inspires me by its vitality, masterful simplicity and expression. This type of work makes my heart sing.

I found the size of my space in the Textiles Workshop very limiting and also noisy and distracting. Once back in my own studio at ANCA on the weekend I resolved to try and loosen up my artwork. I started out making simple black and white monoprints of my drawings using block ink on perspex. Although this gave more animation to my linework, I was still too literal in my interpretation of the subject matter. As I was working with textiles, I decided to try laying down threads of various thicknesses into the ink, then applying the paper over the top and flattening them with a brayer to get an even print. These prints turned out well, and I tried various positive and negative combinations using fine sewing thread to

thicker string. The effect was very pleasing to me, as the threads could be re-interpreted as fungal hyphae, muscle striations or interstitial layering. **(Fig 27)** I used a variety of papers including hand-made Japanese washi, tracing paper, drafting film, Spicers Snowflake designer's paper, tapa cloth and cartridge. I selected approximately 20 monoprints and bound them in a hand-made book for future reference.

3.4 (ii) Illumination

I started to investigate different chemical surface design techniques that could enable coloured dyes to be printed on a coloured background without colour separations, or unintentional mixing of colour between the different layers. The first chemical treatment I tried was illumination, whereby the background colour of a fabric is discharged with a paste that also contains a dye. The paste simultaneously strips out the background colour whilst putting in a new colour. This principle works on the theory that the background colour is a Vat class of dye, whilst the subsequent colours are Fibre Reactive dyes.

I tried a variety of fabrics using this technique including various weights of silk, cotton and hemp. However this technique did not work particularly well for reasons I could not determine at the time and so I abandoned it in favour of Chemical Resist.

3.4 (iii) Chemical Resist

The chemical resist technique also enables different colours to be printed on a coloured background but only works on a cotton substrate. It relies on the theory that within the Fibre Reactive dye class there are differences in the way different

dye molecules bond to the fibre. Remazol is a vinyl-sulphon type of dyestuff whereas Procion H is a chloro-triazin type of dyestuff. The ability of the vinyl-sulphon dyes to react with sulphur instead of the fabric means that it can be washed off areas where it is undesirable. Therefore, if the Procion H dye paste is mixed with a sulphur component, it will resist the Remazol dyestuff in those areas. A slight halo is formed around the intersection of the two dyestuffs – this is where the sulphur has spread slightly.

I tested a number of cellulose substrates including different weights of hemp and a hemp/rayon mix I had bought in Japan. I found that there appeared to be less of a halo on the thicker fabrics than the thin. This is because dye spreads horizontally on thin fabric and vertically on the thick fabric. The extent of background coverage affected the halo size – more background meant a larger halo and vice-versa.

The concentration of dyestuff in the paste influenced the amount of Resist agent required – a lighter background needed less Resist agent than a darker one. Excess Resist agent in the paste had a discharging effect on the design and the second colour was leached out.

I tried many different techniques for applying the two dyestuffs. Firstly, the Procion H was printed through a silk-screen containing photographic images. This was left to dry naturally (heat destroys the process) and then the Remazol background colour was either rolled, squeegeed, printed or painted over the top. This procedure could be reversed, and the Remazol squeegeed on the fabric first and then the Procion printed on afterwards. Reversing the procedure influenced the clarity of the print as well as the halo size. **(Fig 28 & 29)**

I found that Remazol Turquoise was a difficult dye to chemically resist because of its comparatively large molecule size. It was also notorious for back-staining, which can be evidenced in some of my samples. I discovered that certain Procion H dyes I had specially ordered in did not resist at all which took me some time, and several lengths of fabric, to realise.

After both applications of dye are dry on the fabric it is steamed for 20 mins at approximately 100°C (fully penetrative steam). After steaming the fabric is air-dried and then rinsed with cold water for several minutes. Once most of the unwanted Remazol dye has washed off the fabric, it is then boiled for ten minutes in soapy water. This clears any excess dye from the Procion images. The fabric is then rinsed and dried as usual.

3.5 LABORATORY WORK

3.5 (i) Botany and Zoology Laboratory

Dr Gordon suggested I try and work with the antibacterial properties naturally found in species of Eucalyptus. He thought that perhaps that the leaves of certain species might inhibit bacterial growth. In order to test this idea, I collected a large variety of different types of leaves including *Eucalyptus cinerea and E. baxteri* . I bought some large flat baking trays and prepared a litre each of Potato Dextrose (PD) agar and Corn Starch (CS) agar. After autoclaving, I poured 500ml of each agar into separate baking dishes and labelled them. After the agar had set, I divided up my leaves and put half into one dish and half into the other. Some of the leaves I cut into square shapes and made various chequerboard patterns out of them. I then placed a piece of silk over each of the leaves and poured the remaining liquid agar over the top, so that the leaves and silk would be sandwiched inside two layers of agar. The PD tray contracted a lot of air

bubbles under the silk when the agar was poured. In the CS tray I endeavoured to smooth out the leaves as much as I could before pouring the agar slowly, and this resulted in a more even dispersal. Because of this, the PD tray had both anaerobic and aerobic areas for bacteria to grow in, whilst the CS tray was mainly anaerobic. The trays were covered with alfoil to keep out dust and left for three months at room temperature.

After three months the PD tray had a very colourful growth of bacteria and moulds where the silk had been exposed to the air – deep yellows, browns and oranges. Fungi had overgrown much of the tray so no specific leaf forms were visible. The CS tray, on the other hand, had little aerobic growth – most of the growth was anaerobic under the top layer of agar. Some leaf forms were highly visible and identifiable. After viewing the trays, I scraped off the remains of agar and leaves and washed the silk pieces. **(Fig 30)**

3.5 (ii) Scanning Electron Microscopy (SEM)

After making an appointment to meet Dr Roger Heady I was also introduced to Dr Sally Stowe who showed me how to use the various light microscopes their Department had that were connected to the computer. This meant that any image you saw could be captured onto the computer and saved on C.D. for future use.

Dr Heady has been working on the SEM at RSBS for over 20 years, and has had exhibitions and publications of his detailed microscopic work. **(Figs 31 & 32)** After explaining my project to him he agreed to spend some time with me so I could look at my fabrics using the SEM. I wanted to see whether the fermentation process had affected any of the fibres of the various fabrics I had tested. I was also fascinated by the photomicrographs that could be obtained using this method.

The SEM creates magnified images of specimens by using electrons instead of light waves. This makes it possible to show 3D images of higher magnification. Samples are carefully prepared to withstand the vacuum inside the microscope. They must be dried, as water inside a specimen will 'pop' and the specimen will shrivel. Samples are then coated with either a fine layer of carbon or gold in a machine called a sputter coater so that they can conduct electricity. **(Figs 33& 34)** Samples can then be placed inside the vacuum chamber of the microscope. The SEM has a monitor from which operators can view the specimen. This is connected to a computer to enable images of samples to be captured and stored, either as a negative or on the hard-drive. Because the images are created without light waves, they are rendered in black and white. False colour can be provided electronically to emphasis features of interest. It was this fact that fascinated me. Prior to working in the lab I thought that the highly coloured images I had seen in textbooks and magazines were the 'real' colours of the microbes! According to Dr Heady, most operators do not colour their images unless they are for publication. When they opt to colour their images, the selection of colour is entirely arbitrary, although contrasting colours are usually preferred. This is because it is easier to differentiate the background from the object, and to highlight components of interest within that object. **(Figs 35 & 36)**

Over several appointments with Dr Heady, I scanned in samples of a variety of fabrics that had been fermented, as well as control samples of the same fabric with which to compare the results. These were captured onto a CD and printed in black and white. Later, I used Photoshop to colour and manipulate a small selection of the images and these were also used in parts of my digitally printed fabrics.

3.6 PIGMENTING THE SURFACE

Colour exists in itself, possesses its own beauty….
Henri Matisse[37]

Once I had decided on using the chemical resist printing technique to produce my fabrics, my attention turned to their colouration. The major influence on my choice of colour palette came from my work in the RSBS laboratory (as above).

I had started assembling another book similar to **'flowers of evil'** focussing on micro- and macro images of bacteria, viruses, blood vessels, rivers and landforms seen from aerial views and space photography of other planets. All these images had been falsely coloured and I selected and painted up colour chips from them to create my own palette for fabric printing. I named this book **'chromophilia'** meaning an abnormal love of colour. According to the medical Dictionary Search Engine[38] this word comes from the Greek *chromo* (colour) + *phileo* (to love) and is described as the property possessed by most cells of staining readily with appropriate dyes. This colour palette, which was composed of complimentary contrasts, reminded me very much of the palette used in the 1960's, not only in art but in home interiors and fashion.

In the 'psychedelic 60's' drug experimentation, endorsed by psychologist Dr Timothy Leary (1920–1996) and popularised in music by bands such as The Beatles, revived a renewed interest in pattern and colour. Artists such as Frank Stella, Victor Vasarely and Bridget Riley were amongst those who explored dynamic colour combinations in the late '60's.

Batchelor, in his book ‘Chromophobia’[39] explores the concept that colour is associated with altered states of being/perception such as drug-induced sensitivity to colour. Films such as Wim Wender’s “Wings of Desire”[40], Gary Ross’s “Pleasantville”[41] and, of course, Victor Flemming’s “Wizard of Oz”[42] all explore the notion that a heightened state of awareness involves increased sensitivity and acknowledgment of colour. In all three films, the main protagonists are trapped in a monochrome world until an event (an awareness) brings colour into their lives. It is interesting to note that both Stella and Riley worked exclusively in black and white geometric shapes before the 1960’s.

I thought about the relatively recent emergence of bright colour in contemporary Aboriginal art, particularly in the Papunya Tula paintings of the Western Desert, as well as those of Yuendamu and the Balgo Hills. In a recent lecture given at the ANU, John Gage[43] stated that the contemporary use of a restricted palette of natural ochres was a European concept and that Aboriginal painters were eager to use whatever colour came their way. The adaptation of contemporary media by Aboriginal artists has been replaced by innovation, especially in music, visual and performance art. My view is that perhaps they also have a heightened awareness and spiritual link with their land and access to new and vibrant colours enables them to express themselves more fully.

There has also been a re-emergence of full-blown colour and pattern from contemporary western artists such as Jim Lambie (Scotland), Damien Hirst (UK) in his “Pharmacy” series of paintings, and Melinda Harper from Australia. Is it a coincidence that today’s culture is also experimenting with designer drugs not heard of in the ‘60’s for both recreational and cosmetic purposes?

3.6 (i) Digital Colour

With reference to the thousands of colours available in the standard computer graphics software available today, Batchelor seeks to explain the difference between a commercial colour chart and the artists' colour circle.

> *"The colour-chart colours have contributed to a further change in the use and understanding of colour. This might be called the digitalization of colours, whose opposite is analogical colour. The colour circle is analogical, the colour chart is digital. Analogical colour is a continuum, a seemless spectrum…Digital colour is individuated…there is no mergence or modulation….Analogical colour is colour; digital colour is colours.* [44]

The use of digital colour has created a virtual 'asexual' colour palette that is accessible 24 hours a day. I wondered whether this access and subsequent divorce from the physical aspects of mixing colour also creates an emotional distance between the artist and colour. Can too much choice of colour be detrimental in the understanding of colour? Or does it guide us towards understanding the future – the artificial, the world of science-fiction, LED and plastic - just as the artists of the 60's grappled with the idea of using commercial paints from a can.

Does the over-stimulation of colour to mass culture by industry and marketing produce colour-sensitivity, so that we revert back to achromatics for mental and visual repose? I have found in my own practice that the use of certain colour palettes comes in cycles and that these appear to be in a subconscious balance between monochromatic and polychromatic phases. When working with a restrained palette that to others appears to be "colourless", such as the "biota" and "nigredo" series of textiles, I seem to find an infinite variety of colours to work with. However, after undefined periods of time, I often feel the need to break out and focus on joyous, undiluted, intense, pure colour.

3.7 ARTIST IN RESIDENCE AT STURT GALLERY, MITTAGONG

During the month of July I was offered an Artist-in-Residence placement at Sturt Gallery, Mittagong. This residency was initiated by Megan Patey, Director of Sturt, whom I had met the previous year whilst attending the Pojagi Master Class. She applied for funding through the Ministry for the Arts that enabled me to conduct a solo exhibition and to live and work at Sturt for five weeks. The residency included a generous stipend and in return I conducted two workshops for Sturt - a natural and synthetic dyeing workshop, and a screen-printing workshop for beginners.

This residency was a fantastic opportunity for me to focus completely on my practical work without family or social obligations. I lived in the comfortable cottage and used the large, airy and light weaving room as my own studio. I set up several tables for printing and sewing, cutting and assembling.

During my stay I planned and completed the pieces that were due for my ANU assessment. Local op-shops provided me with haberdashery items such as embroidery hoops and jars of buttons. For the first time in many years I felt complete freedom to work as long or as late as I liked. This autonomy enabled me to approach my work in a more playful way, not having to worry about time and its constraints. As Mittagong is only two hours from Canberra I travelled back and forth for several events including the Sari to Sarong conference at the NGA and, of course, assessment.

3.8 CHROMOPHILIA

My exploration into colour perception evoked a number of questions that I hoped to answer in my artwork.

How were colours changed when they were placed together in various combinations? There are both simultaneous contrast phenomena and attractions phenomena that push colours in different directions. Only a colour system that is based on perception will be able to describe these phenomenon, as 'objectively' the properties of the radiation reflected from the surface is unchanged. Many of the works intended for assessment explored this phenomenon by changing the colours of fabric backgrounds and images to see which colours 'bounced' off each other. I also used buttons and stitching to further contrast size, shape and colour and to 'interrupt' colour fields. **(Fig 39)** The same colour, placed on differently coloured grounds, appeared different from its true value because of the phenomena of 'irradiation'.

How were colours changed when they were seen from various distances? There are many factors involved such as successive and simultaneous contrast, the light and clarity of the air, etc. To identify this factor I presented my fabric 'croquis' in two different forms, arranged so that the viewer would have to stand at different distances from them for viewing. The first set of samples were stretched around frames approximately 45cm square. They were presented in a grid-like fashion, two frames across and three frames down, so that they butted against each other. This produced a fairly intense "wall' of colour which the viewer had to stand back from in order to take it all in. The second set of samples were stretched inside different sized wooden embroidery hoops painted a neutral grey. The largest hoop measured 60cm in diameter, whilst the smallest circles were actually buttons covered with the different fabrics. These circles of fabric were arranged so they meandered across a four-metre white wall. In order to see detail, the viewer had to stand very close. **(Fig 38)**

In what way are colours dependent on the size of the coloured surface? The perception of the small colour sample is probably not the same as that from a

much larger sample of the same colour. Combinations of colours in different proportions can impart tension within an artwork, which can be further enhanced or denied by the form it inhabits. The shape or form of a colour can affect the kinetic result produced according to its spatial relationship with other coloured forms.[45] In part this question was explained by exhibiting very tiny self-covered buttons and larger squares and circles of the same fabric. Depending on its size, shape and proximity to other colours within the field, the same colour could look surprisingly different.

This semester's investigation into form and colour relationships in textiles strengthened my ideas for the works that I wished to present for my final assessment.

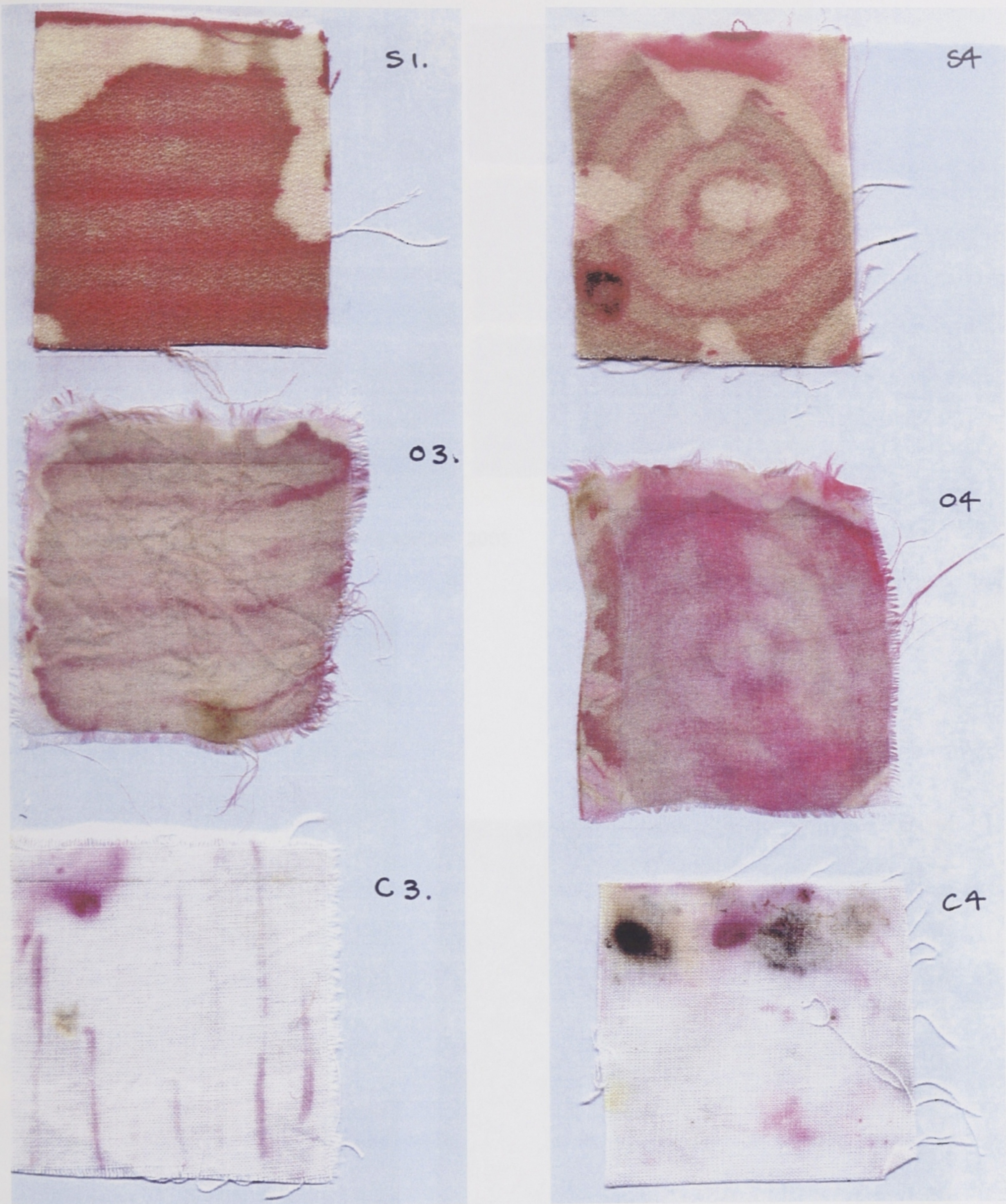


Fig 26 Six samples showing *Serratia marcescens* colouration of silk, silk organza and cotton fabrics

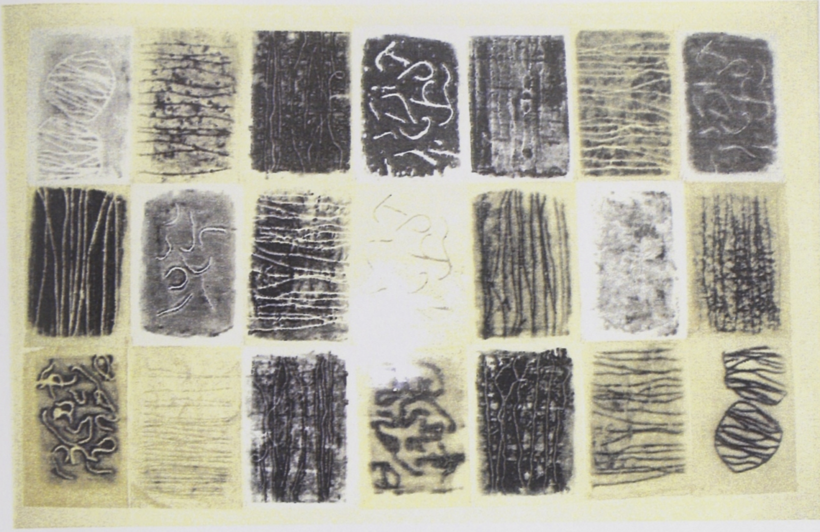


Fig 27 Monoprints on various papers and acetate, 2003

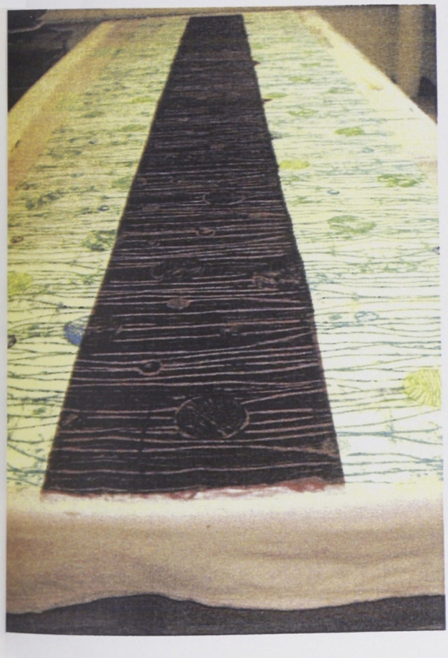


Fig 28 Length of chemical resisted cotton

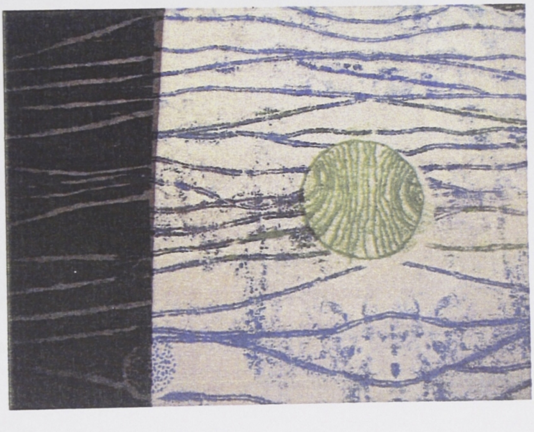


Fig 29 detail of Fig 28

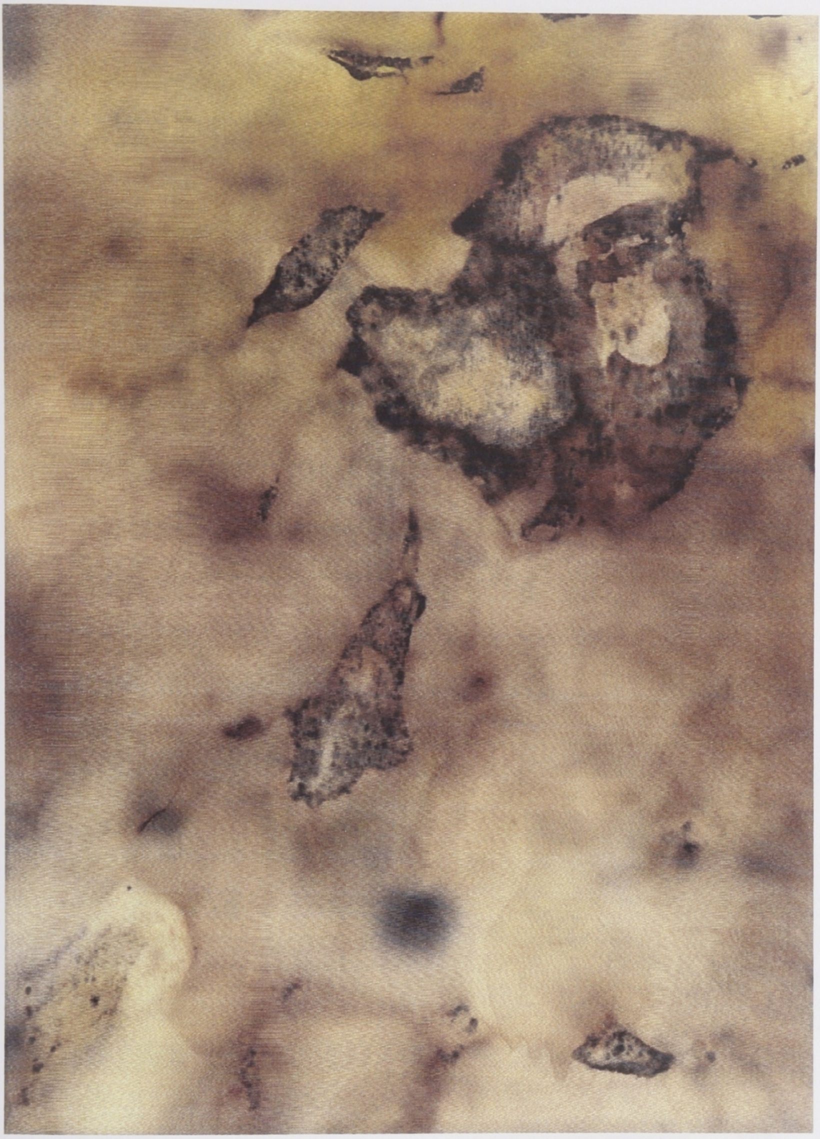


Fig 30 Detail of silk fabric using Eucalyptus leaves. Fabric and leaves were placed within two layers of Potato dextrose agar and left to ferment for six months.

Fig 31 Dr Roger Heady, filling the SEM with liquid nitrogen at RSBS

Fig 32 The SEM monitors linked to the computer.

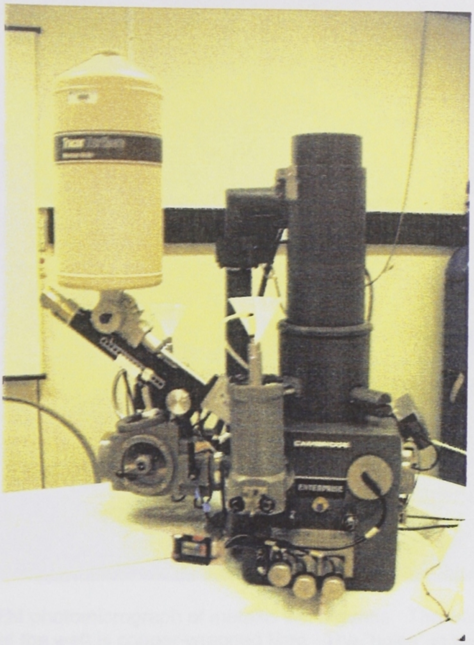


Fig 33 View of the SEM chamber

Fig 34 Preparing samples for the sputter-coater

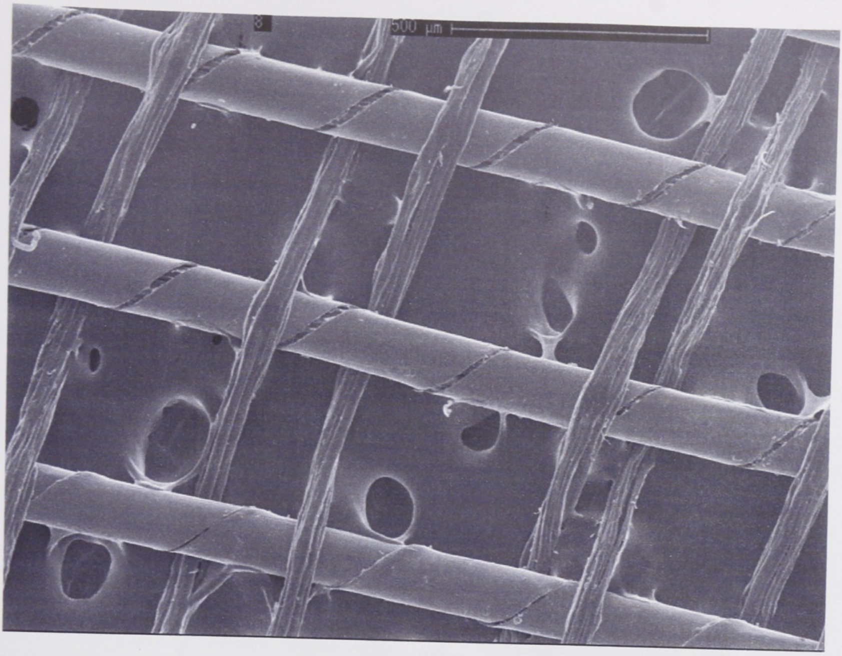


Fig 35 SEM photomicrograph of metallic silk organza. The warp is silk (two strands) and the weft is copper-wrapped fibre. The "holes" in the background are where the sheer fabric is adhered to the mount.

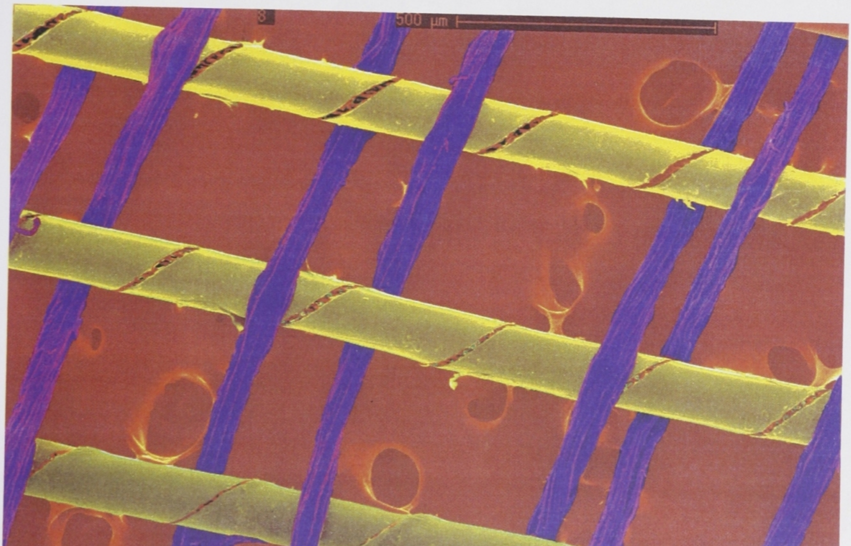


Fig 36 The same SEM but false-coloured using Photoshop to differentiate fibres from each other and background

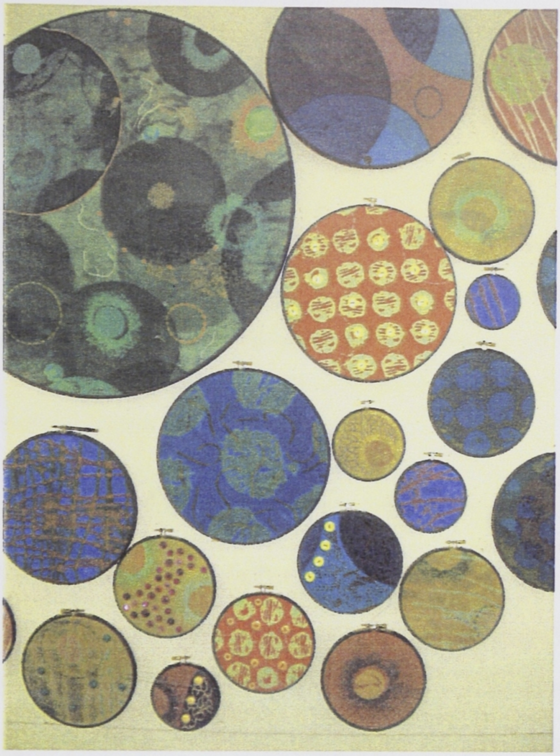


Fig 37 Detail of ‘Chromophilia” printed and stitched pieces

Fig 38 View of installation for mid-year assessment.

The aspects of all things which are most important for us are hidden because of their simplicity and familiarity (one is unable to notice something because it is always before one's eyes). The real foundations of his enquiry do not strike him at all."

Wittgenstein

CHAPTER FOUR - DICHOTOMY
SEMESTER TWO, 2003

4.1 BACKGROUND

From my exploration of colour and chemical resist in the previous semester, I turned my attention to pattern and repetition to investigate whether the size and/or placement of motifs affected the perception of colour.

I worked with Dr Roger Heady to scan samples of fermented and non-fermented fabrics with the SEM to assess whether this process actually damaged the fibres within the fabric. **(Fig 39)** These scans were saved onto CD and later used in conjunction with Photoshop to produce digital croquis for textile designs.

I attended the 'Textiles and Technology II' seminar at COFA, UNSW in Sydney where I met Longina Phillips and Sylvia Balog from Direct Digital Printing (DDP) in Sydney. I discussed the ideas I had for digitally printed textiles with them and later received a package of information and samples to inform my project. Earlier in the year I had received a Post-graduate Materials Grant from NITA to enable me to prepare and digitally print textiles for my final assessment. The two viable options for digitally printed fabrics were to get them printed either at the Glasgow School of Art or at Direct Digital Printing in Sydney. I investigated both options, and after talking with Bruce Carney, (Textile Designer, Sydney) I decided to get my fabrics printed in Sydney.

This semester comprised four units of studio practice undertaken in the Textile workshop in conjunction with the Research School of Biological Sciences and digital printing by Direct Digital Printing in Sydney.

4.2 REPETITION

The use of repetition in my work is inspired in part from observing nature but also from my training as a designer working in multiple modular units. Repetition is the crux of textile design – without it there would be no *design*, only a placement of image(s). Repetition enables fabrics to be printed continuously; good textile design enables fabrics to be produced seamlessly. An experienced textile designer will have a complete understanding of the eight or so traditional repeat systems, and will be able to choose the right system for the client's brief; the motifs used; the scale of design; the substrate to which it will be printed on; and the various types of repetition available such as mirroring, duplication, folding etc.

Repetition occurs not only in motif form in my work, but also through the use of hand stitching which weaves meditative pathways through many of my textiles. The use of both running stitch and seed stitch transform my printed designs to three-dimensional works. I often use hand-dyed threads that match the background fabric, so that these stitches are barely discernible until the viewer is up close. **(Fig 40)**

> *"The decorative motif of repeating stitches suggests the human imprint of experience, the colours reminiscent of coastal encounters of sand, sea and wind. Like footprints in the sand, these marks trace along the edge of a story"*[46]

Repetition of an image renders it visually stronger. A series of images places us in time – evokes a narrative. This impression of time is increased or decreased by the density and proximity of images. Rhythm can be built up depending on the placement of images. Radial and spiral patterns evoke an explosive quality; symmetrical placement evokes order and asymmetrical patterns are expressive and visually exciting.

In science, *repetition* is an integral part of proving hypotheses – experiments must be able to be duplicated by independent scientific institutions in order for them to hold true. *Reproduction* of an organism is produced by either simple binary fission (as in the case of bacteria), mitosis or meiosis (as in the case of human cells). In genetic processes there are three basic methods of repetition - replication, transcription and translation.

Repetition is so vital to basic life that it occurs in almost every thing around us. This is a critical fact towards our ability to survive. Our mind is constantly processing information about our surroundings, and is uncontrollably driven to find meaning from external stimuli. When we cannot find meaning we become tense, irritable and angry. When the answer comes to light, we are relieved and often express this tension release through laughter.[47] When we experience everyday repetition, our brain tunes out in order that we can get on with our lives. If it did not tune out we would be in a constant state of amazement and alertness, and this would be detrimental to our health and our survival. The mind often operates under the *law of simplicity* to obtain closure, and I was interested in testing this phenomenon with my printed lengths of fabrics.

4.2(i) Scale

The scale of an artwork is an extremely important factor in the experience of seeing it. Multiple ocular fixations are required in order to see a large work, whereas only one fixation is required for a miniature. The larger the work, the more involved the viewer has to be with it. When we see small repeating patterns they often tend to 'shimmer' before our eyes. This vibrating effect may be due to the rapid oscillations of the eye to take in the after-image and border-contrast effect, especially with highly coloured works. In black and white, a more three-dimensional effect is produced, as in the Bridget Riley's paintings of the

'60's. This 'shimmering' was similar to the effect Aboriginal artists were after when they used fine cross-hatching, small dots and thin lines in their artworks.

In my textile works,**' dichotomy'**, I have combined simple images with contrasts of scale, colour and repetition to identify the visual impact these elements bring to a design. Lengths of printed Japanese cotton, five metres long by 40cm wide, jostle for dominance against a wall of framed circular pieces of various diameters. Colours clash and jar, patterns oscillate before the eyes. This visual juggling is about keeping the balance between structure and surface, strength and fragility, formal aesthetics with intellectual concerns. **(Fig 41)**

4.3 Science and Art

"The biological and physical sciences provide ... artists with examples of processes regularly occurring in nature, and the artists use science as a means of exploring relationships between art and the world. These artists use repetition to depict and evoke nature's processes...."[48]

Many artists have used science and scientific illustrations as a springboard for their own artwork. The image of the cell in particular has inspired the likes of Diego Rivera, Jean Arp, Wassily Kandinsky and Max Ernst.(Ref), and more recently Terry Winters, Damian Hirst, Paul McClure and Randy Garber.

A contemporary American textile artist who has been using chromosomes and genetic information as a reference since the 1990's is Jane Lackey. Research into scientific technologies such as Magnetic Resonance Imaging (MRI) and aerial and space photography provide Lackey with the visual information she needs to map physical and psychological space in her textile work. Using

industrial felt as a base, Lackey burns the surface with a poker and then adds layers of pigment or wax to provide a dense surface. She then scrapes back into the layers, uncovering previous marks whilst adding new ones. In a later series of work Lackey has drawn inspiration from the notation system for the human DNA sequence.[49] As Craig posits in his article, Lackey questions the categorisation between genetically encoded memory in DNA and acquired memory, both of which are pivotal to identity. On several of her pieces she has used the repetition of the letters A, T, C and G, which stand for the nitrogenous base pairs of DNA – adenine, thymine, cytosine and guanine - in conjunction with parts of other information systems such as the dictionary.**(Fig 42)** Her inference is that both the body and the dictionary harbour vast archives of information that must follow specific routes in order for the outcome to have some significance. The issues of patterning, order, sequence and repetition are themes that I have already elaborated on earlier in this report.

There are increasing numbers of contemporary artists who are working in direct conjunction with scientists, or pursuing their own 'scientific' inquiries into projects that involve *actual* cell or tissue culture. Perhaps the most well known of these is Brazilian artist Eduardo Kac, who rose to notoriety with his 'Glow Bunny' known as Alba, in 2000. **(Fig 43)** Kac (together with researchers from INRA – France's agricultural research body) created a transgenic rabbit that glowed green under certain light conditions by splicing green fluorescent protein from a pacific jellyfish into the rabbit zygote. Before Alba, Kac injected himself in the leg with an ID chip on live television in 1997, to demonstrate his obsession with "otherness".[50]

Australia's Tissue Culture and Art Project (Oron Catts, Ionat Zurr and Guy Ben-Ary) have been researching into the use of living tissue technologies as a medium for art practice since 1996. By culturing cells onto artificial scaffolds, they

produce 'semi-living' sculptures that contest contemporary views on objects, identifying complex ethical and social implications.

> *"The conceptual and practical work of TC&A blurs the boundaries between what is born/manufactured, animate/inanimate and further challenge our perceptions of and interaction with our environment."* [51]

In my own work I have attempted to explore the processes of both growing the actual microorganisms that produce colour and form onto fabric as well as exploiting the images that I have scanned into the SEM. My fabric designs consist of enlargements of minutiae, cells suspended in a state of mitosis, organelles adrift - all ambiguous in time and space. Textures derived from textile magnifications are juxtaposed with clusters of marks reminiscent of bacterial colonies and fungal growth.

4.4 Dichotomy

The work for my final assessment, entitled **'dichotomy'** was displayed in the Canberra School of Art Gallery. There were four main bodies of work presented as well as back-up work including the two bound books on colour and monoprints.

The first body of work consisted of an installation of over fifty different printed textile designs that were framed inside painted embroidery hoops. The diameters of these hoops ranged from 60cm down to 4cm. The concept behind the hoops as framing devices referenced the act of growing bacteria in the petri dishes as well as looking at biological samples under microscopes. The circular forms were placed randomly on the wall to mimic the rhythm found in natural life processes such as cell reproduction and replication. **(Fig 44)**

The second wall exhibited eight narrow (40cm wide) cloths and three wider ones (90cm), all of which measured five meters in length. These cloths were all hand-printed using the chemical resist technique, which was a major feat in itself. Due to the technical aspects of this process it was very difficult to get the background colour on evenly, but this is also the intrinsic nature of hand-printed cloth. If I had wanted it 'perfect' I would have had the designs industrially or digitally printed. As it is, I think the cloths bear the marks of human intervention and interaction. **(Fig 45)**

None of the designs on the larger cloths are in formal repeats – they were devised using numerous small screens and the exploitation of the resist technique. They contain more complex information than the narrower cloths – and are in fact the product of several of the narrow cloth designs. This is a comment on the way information is exchanged and transferred from one cell to another, depending on the reproductive method. The narrower cloths represent 'gene strands' which carry the basic information into the new cell. This information can be 'genetically' altered or mutated along the way, evidenced by changes of scale, colour and placement in the wider cloths. These cloths also infer that traits can be sourced from many different origins, both inherited and acquired.

The third wall showed a series of five digitally printed silk hangings, measuring 40cm by 200cm. These hangings employed images derived from both hand-printed and stitched textiles as well as microscopic analyses of fabrics. The digital designs were developed using Photoshop and printed onto silk crepe-de-chine with acid dyes at Direct Digital Prints in Sydney. The fusing of hand and digital images implies a narrative about the intervention of new technologies into traditional realms. The digital (in the shape of bacterial and fungal forms) insinuates itself like a fungal filament or hyphae into the very fibre of tradition (the

hand-stitched, handprinted fabrics). It is a symbiotic relationship whereby one feeds off the other to survive. The colours used are complementary contrasts to emphasise this notion. The future must be embraced with enthusiasm and intelligence in order for the past to survive. **(Fig 46)**

The final body of work encompasses several mounted digital designs that derived from scans of both my existing fabrics as well as the SEM scans. Here I have explored my full understanding of Photoshop and its applications, without regard for repeat systems or printing viability. By exploring layering techniques, mark-making with existing and hybrid tools, the unlimited possibilities of analogue colour and the fusing of the real and the virtual I have developed a series of croquis that suggests the narrative of time –both natural and digital. **(Fig 47)**

CONCLUSION

It is almost with shock that I find myself at the end of my studies – two years have flown by so quickly, and I feel that there is so much more to say and do with regards to my project. In writing this I realise that that *is* the point of the Masters degree – it is not an *end* but a *beginning* - an opportunity to revisit existing ideas armed with new intellectual and creative approaches, as well as the capacity to develop new ones.

As with many post-graduates, I found that my initial ideas and proposals for the course of study changed along the way, as I learned to challenge those ideas, articulate my position, and accept criticism from my supervisors and peers. The core units of study expanded my theoretical insights and increased my confidence in talking and writing about my work.

Initial research into the microflora found growing on fabric during the fruit fermentation process was undertaken under the guidance of Dr David Gordon, at the Botany and Zoology Laboratory at ANU. We tried a variety of nutrient agar bases to determine which microorganisms grew under certain conditions. These bacteria and fungi were then isolated and re-grown onto the same agar, then transferred to fabric. Many of the plates subsequently became overgrown with fungi that made isolating many of the coloured bacteria almost impossible. Eventually growing a pure culture of *S. marascens* enabled me to make initial experiments with directing the growth of bacteria into different designs on fabric.

I feel that there is a wealth of investigation that could transpire with regard to culturing specific bacteria for colour on textiles, but this could not be accomplished within this particular course of study, or without formal associations with other ANU Departments. However, I hope that the relationships that I have

made with other ANU scientists will continue to inform and inspire my work, and perhaps lead to future art/science collaborations.

By working with Roger Heady over at the Research School of Botanical Science I was able to use the Scanning Electron Microscope to scan samples of my fabrics that had been fruit fermented. These scans enabled me to see the actual fibres of the fabrics, as well as the bacteria and fungal hyphae that remained on some of them. The saved images were then used as visual resources for new digital and hand printed designs.

Along with other new surface design procedures I investigated the technique of Chemical Resist thorough and printed all my final work using this method. In addition, the receipt of a Post-Graduate materials Grant enabled me to have some of my digital images printed onto silk fabrics, by Direct Digital Designs in Sydney.

The most valuable tool that I take away with me is the knowledge that I have the capacity to initiate change within my art practice and intellectual concepts, and that this change can be embraced and enjoyed rather than enforced and endured. By accepting the challenge for change I have developed a stronger visual vocabulary, which now includes new technologies and practical skills, to launch me further in the future.

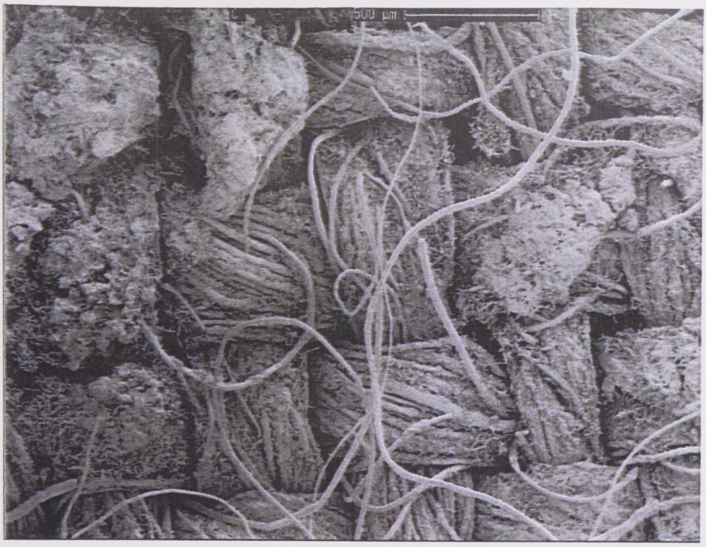


Fig 39 SEM microphotograph of fruit fermented wool fabric showing detritus and fungal hyphae

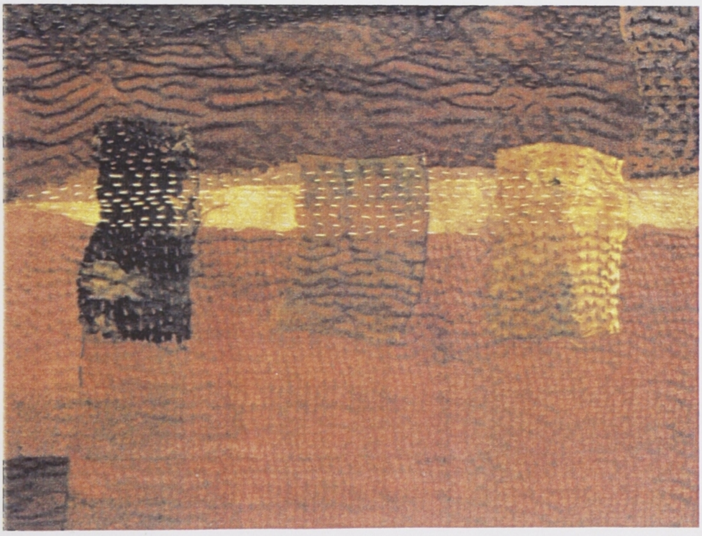


Fig 40 Detail of *'territory'* constructed fabric, silk, stitch, 2002

Fig 41 Julie Ryder (Above and below) Views of “Chromophilia” (left) and “Threads of Life” textile installation, 2003. Cotton, reactive dyes. Height 500cm, width variable

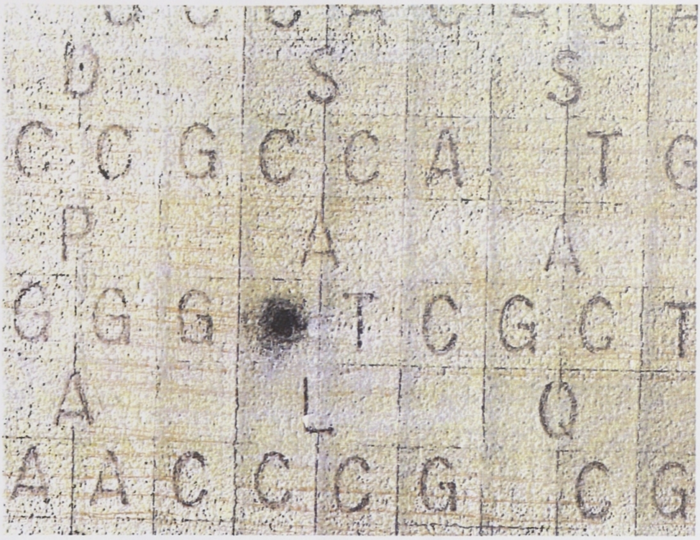


Fig 42 Jane Lackey *'Column 1' (detail),* 1997. Acrylic on Cork, masonite (60 x 30 x 2.5cm)

Fig 43 Illustration for E. Kac's Glow Bunny, from Wired,April 2001, p.88

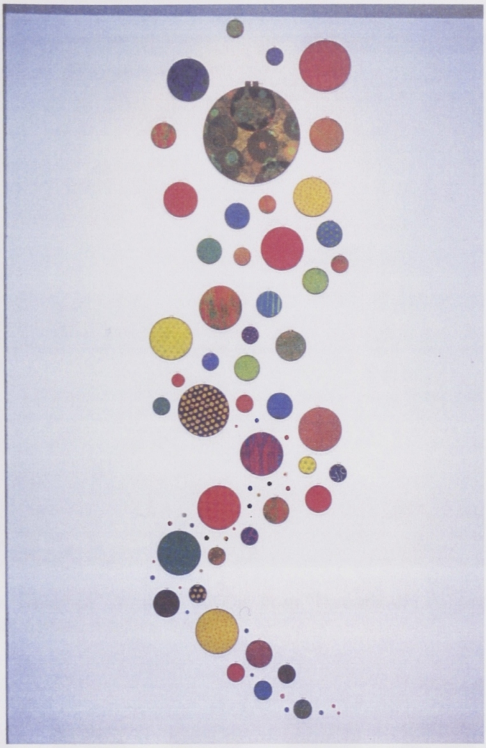


Figure 44 a Julie Ryder "Chromophilia", 2003; Cotton, reactive dyes, wooden hoops
This installation : length 500cm, width 150cm (dimensions variable)

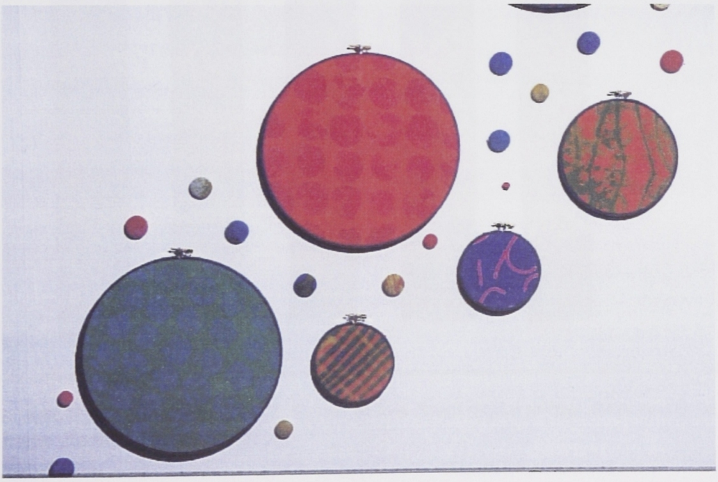


Figure 44b : detail of "Chromophilia"

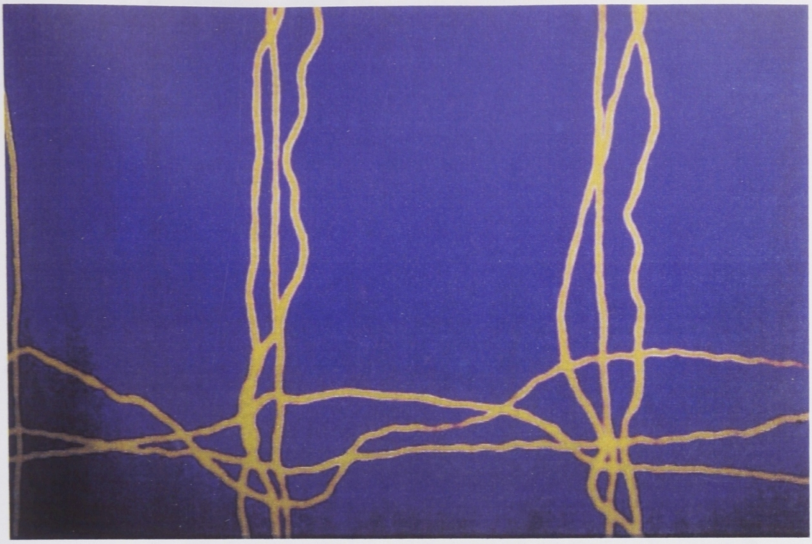


Figure 45. Julie Ryder Detail of “Strand G”, 2003, from “Threads of Life” series. L: 500cm, W: 40cm. Japanese yukata cotton, reactive dyes.

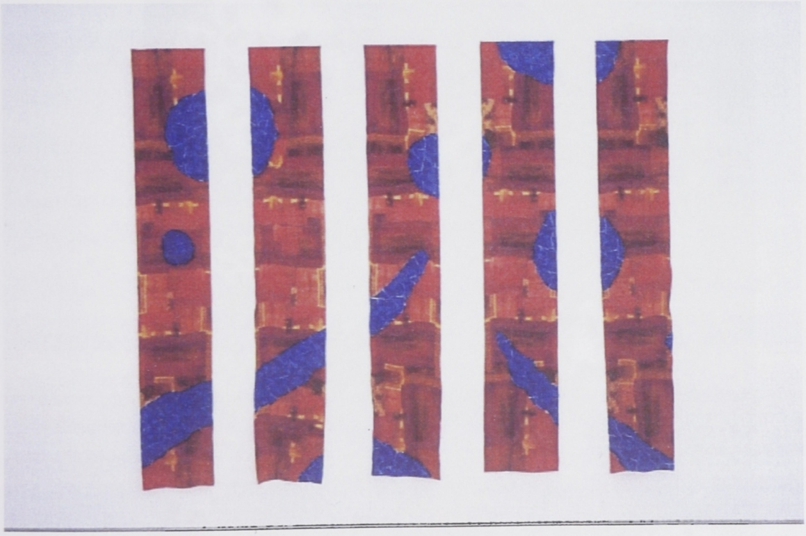


Figure 46. Julie Ryder “Infiltration” 2003. Series of five direct digital prints. Reactive dyes on silk crepe de chine. Each L: 200cm, W: 33cm

Figure 47 Julie Ryder, Digital print 2003

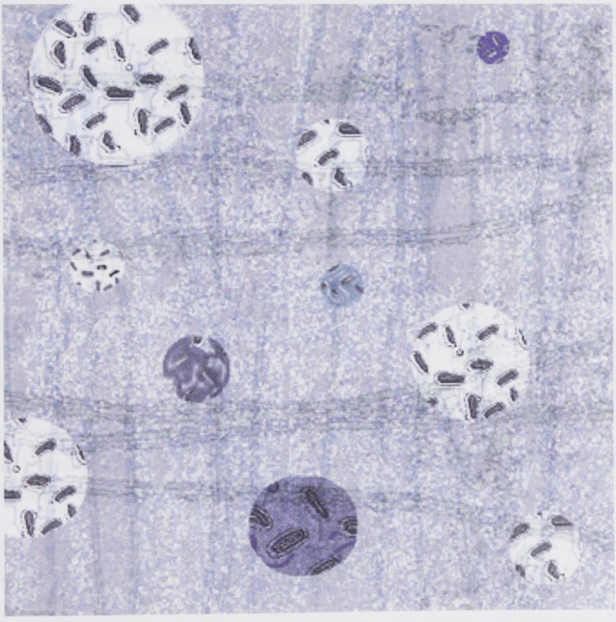


Figure 48 Julie Ryder, Digital Print 2003

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APPROVED STUDY PROGRAM

Outline of the Research Project

My work to date has focussed on experimental techniques of surface design on fabric, primarily a fruit fermentation process and other textile monoprinting techniques. More traditional methods of textile embellishment such as screenprinting, stitching and applique are also incorporated into my work. Personal research into the parallels between the fruit fermentation technique and the practices of ancient alchemy involved looking closely at the decomposition and deconstruction of materials. This resulted in a solo exhibition, *d-composition,* at Craft Victoria and Craft ACT in 1999.

For this project I would like to research further into distressed textiles and the methods used to produce them. I would explore the various 'abusive' treatments we inflict onto textiles in order to render them visually appealing. These techniques would encompass natural, chemical and mechanical applications. These methods would include

- decomposition of cloth (e.g. burial of cloth both with and without other objects)
- fermentation (using bacteria and moulds to stain and mark cloth)
- deconstruction techniques (the beating and retting of fibres for cloth; slashing, piercing and abrading as well as other mechanical techniques)
- chemical treaments (devore, discharge and cloque).

I would also research into the practice and philosophy behind the 'wear and tear' of fabrics, the values placed on the preservation of cloth, and the many transformations it undergoes in the 'make-do' culture.

Methods and resources

For this project I would focus on mechanical and chemical treatments of fabrics including devore, discharge, cloque, monoprinting and silk screening, and many experimental methods of mechanical abrasion and distressing on cloth. I own a lot of my own equipment and materials but would need to access the Textiles Workshop print room, dye lab, steamer and Print Media's photographic screen preparation facilities.

I would like to connect with other scientific departments of the ANU, such as Microbiology, to further my research into the fruit fermentation technique.

Context

I am interested in researching and confronting accepted notions of 'beauty' – what is it we find beautiful and why – through the medium of textiles. Many of the methods used to produced 'beautiful' textiles are aggressive and contain processes which we may find abhorrent. Yet these processes produce the surface patination and decoration we find attractive.

Other artists and cultures have utilised various methods to date which I would use as reference points, for example: the tapa cloth of the South Pacific islanders; the production processes of linen (retting); the slashed, pierced and abraded fabrics of the 16th and 17th century in Europe; and Japanese sashiko.

Contemporary artists who work in similar ways would be: Chiyoko Tanaka (Japan); Anne Wilson (USA); Susan Lordi Marker (USA), Annie Trevillian (Aus); Liz Williamson (Aus); Janet Ledsham (UK); Inken Waldsen (Germany); Russell Sage (UK) and Reiko Sudo (Japan).

I have been fortunate enough to have done some research on this project already at the V&A in London last year, and have seen many examples of both historical and contemporary practice "in the flesh".

Resources

Books

- Art Textiles of the World (Japan, USA, UK), Telos Publications
- A History of Dyed Textiles, Stuart Robinson
- The Secret Art, Stanislaus Klossowski
- The Alchemists handbook, Albertus Frater
- Tapa Cloths of the South Pacific, Neich and Prendergast
- The Blood and the Shroud, Ian Wilson
- Prehistoric Textiles, E. W. Barber
- Dyes and Fabrics, Joyce Storey
- Cloth and Human Experience, Weiner and Schneider

Magazines

- Shuttle, Spindle and Dyepot,
- Fibrearts
- Surface Design
- International Tapestry Journal
- European Textile Network (ETN)

ARTIST STATEMENT

Since 1995 I have been investigating into a fruit-fermentation technique for textile surface patination and colouration, which I have termed 'nigredo' after a transformative phase in alchemy. The bacteria and moulds produced by the rotting fruit ferment over several months, staining the cloth with natural dyes and leaving a ghostly pattern of the segmented fruit behind.

During the course of the Master of Arts (Visual Arts) degree I have been researching into the effects these microorganisms have on cloth by working in conjunction with several science departments at the ANU. Electron and Scanning Electron Microscopy have informed my latest body of work. I have used images of my scanned fabrics and microorganisms to form new designs and motifs for my textiles. In SEM images are produced in black and white, so any colour is introduced and enhanced by computer software programs. I have investigated the use of the digital colour palette in this latest body of work, and have interpreted it through hand-printing with reactive dyes onto cotton fabrics.

Through my art practice I investigate the tenuous link between control and chaos, questioning perceptions of beauty and order. The use of transparent fabrics comments on the notion of the fragility of life and the layering of experiences that construct it. By playing with the effects of opacity and translucency, certain images are revealed whilst others remain hidden, only to be disclosed when viewed from another angle.

I search for hidden meanings in the apparent chaos of life by focussing on the micro- and macroscopic aspects of the world around me.

CURRICULUM VITAE

NAME: JULIE ANNETTE RYDER
ADDRESS: P.O. BOX 104
JAMISON CENTRE 2614 ACT

EDUCATION

ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY

1978 - 1985 Cert. Applied Science (Medical Laboratory Technology)

MELBOURNE INSTITUTE OF TEXTILES

1988 - 1990 Diploma of Art, (Textile Design and Production)

NATIONAL INSTITUTE OF THE ARTS (ANU)

2002- 2003 Master of Arts (Visual Arts) Textiles

RELEVANT EMPLOYMENT

2001- Casual employment with Canberra School of Art and Megalo Access Arts for textiles workshops.

2000 -2001 Sessional Teacher, Textiles Dept, UTS, Sydney

1999 - 2001 Sessional Teacher, Textiles Dept. Canberra School of Art, ANU.

1992 - 1999 Teacher, Textile Printing and Design, RMIT Textiles Diploma of Arts, (Textile Design and Production) and (Screenprint Design)

1992-1993 Sessional Teacher, Fabric Surface Decoration, Box Hill College of TAFE.

1992 Training Consultant - DEET- Retraining in Rochester enabling them to establish their own textile printing studio.

1990 - 1992 Studio Assistant / Printer, Printintin Design Studio Melbourne.

FREELANCE

1992 - present Established own textile design business designing and printing textiles for homewares, soft furnishings and fashion accessories. Freelance design, consultation and commission printing for many clients:

- International Wool Secretariat • Queensland Art Gallery • Victoria State Opera
- Emily's List (Hon. Joan Kirner) • M. I. Text • GRDC • Opera Australia
- The Australian Ballet • Beauty and the Beast • Bob Murphy, Theatrical Costumier
- Essendon Football Club • National Gallery of Victoria, Costumes & Textiles Dept.

PROFESSIONAL

2004 Artist in Residence, Megalo Access Arts

2003- Artist in Residence, Sturt Gallery, Mittagong, NSW

2001 Artist in Residence, Majura Women's Group, Backyard Project, Canberra

1998 Artist in Residence, Megalo Access Arts, Canberra (Jan 24 - Feb 8)

1997 Accredited "Craftmark" Practitioner, Craft Australia

1993 Artist in Residence, Shepparton Art Gallery (Jan)

AWARDS

1997 Winner, Gold Medal, International Textile Design Competition, Taegu, Korea.

1996 Joint winner, Award for Excellence & Innovation, Hand To Cloth Exhibition, MMCC

1996 Finalist, Victorian Design Awards (Commended).

1992 Special Merit Award, Gown of the Year.

1990 Scholarship, Silk Workshop with Karen Selk,(USA) provided by the Handweavers & Spinners Group of Victoria.

1990 Achievement Award, Best 2nd Year Student, Melbourne Institute of Textiles.

1989 Achievement Award, Best 1st Year Student, Melbourne Institute of Textiles.

PUBLIC COLLECTIONS

2003 Sturt Gallery

2001 Tamworth City Gallery

1999 Powerhouse Museum, Sydney

1999 National Gallery of Victoria

1998 Nederlands Textiel Museum, Tilberg, Holland.

1997 National Gallery of Victoria

Private collections in Australia, U.K. U.S.A, Japan, New Zealand, Netherlands

GRANTS

2004 Arts ACT Quick Response Grant

2003 NITA Postgraduate Materials Award, ANU
2000 Australia Council, Visual Arts Grant
1999 Pat Corrigan Artists Grant, NAVA
1996 Arts Victori Project Development Grant

SOLO EXHIBITIONS

May 2004	**Microcosm** CSIRO Discovery Centre , Canberra.
July 2003	**Biota: textiles**, Sturt Gallery, Mittagong.
March 2002	**territory,** Planet Furniture Gallery, Surry Hills, Sydney
July 2000	**Australian Alchemy,** Lesley Craze Gallery, London
March 2000	**Recent Works,** Planet Furniture Gallery, Surry Hills, Sydney.
June- Aug 1999	**d-composition,** Craft Victoria and Craft ACT
December 1995	**Preserve,** Blackwood Street Gallery. Melbourne

SELECTED GROUP EXHIBITIONS

November 2004	*a matter of time* 16th Tamworth Fibre Biennial, touring
May 2004	City of Hobart Art Prize 2004
April 2004	*Lining Material,* Bread Box Gallery, Perth and Strathnairn, ACT
March 2004	*Horizons*, Canberra School of Art Gallery, ANU, Canberra
January 2004	*Pojagi*, WACO Arts Centre, Texas, USA touring
August 2003	*Unwrapped: Australian Fashion and Textile Design*, Bendigo Art gallery, touring until 2004 with Asialink to S.E. Asia.
December 2002	*Pojagi and Beyond*, Fairfield City Museum and Gallery, Smithfield, Sydney
November 2002	*Innovative Textiles,* Ararat Gallery, Victoria
September 2002	*Canberra to Kyoto*, Gallery Fleur, Kyoto-Seika University, Japan
September 2001	*Cryptal Orchard Revisited.* FOCA, ANCA Gallery, Canberra
August 2001	Asian Fibre Art Festival, Fukuoka, Japan
July 2001	*Ensembles.* Object Gallery, Customs House, Sydney (CD ROM)
April 2001	26th Alice Craft Acquisition Award, Alice Springs, N.T.
March 2001	20th National Craft Acquisition Award, MAGNT, Darwin.
September 2000	14th Tamworth Fibre Biennial, Tamworth City Gallery, touring
April 2000	*Australian Decorative Arts Survey 2000*, Lauraine Diggins Fine Art, Melbourne
March 2000	*Strength to Strength,* Craft ACT, Canberra
December 1999	*Masters of Technique.* Monash Art Gallery,touring nationally
October 1999	*Organic,* McLelland Gallery, Langwarrin, Victoria
September 1999	*Cryptal Orchard*, FOCA, Craft ACT
May 1999	25th Alice Craft Acquisition, Alice Springs, NT.
October 1998	2nd Taegu International Textile Design Exhibition, Korea
October 1998	*Hand to Cloth* - Origins - Metro Craft Centre
August 1998	San Francisco International Gift Fair, Craft Australia, USA
July 1998	*Great Lengths*, Tuggeranong Art Centre, ACT
July 1998	*Putting it in Print*,, Craft ACT, touring nationally,Nara, Japan
March 1998	*Web, Warp, Weft Woof*, Manningham Gallery, Victoria
November 1997	Mornington Peninsula Regional Gallery Art Award Exhibition, Victoria
October1997	1st Taegu International Textile Design Exhibition, Korea
September 1997	National Craft Acquisition Award, MAGNT, Darwin.
July 1997	*Australian /Korean Textile Exhibition*, Storey Hall, RMIT , Melbourne
May 1997	Interior Designex - Melbourne - Designer/Maker stand N7.
October 1996	*Hand to Cloth*, Meat Market Craft Centre , Melbourne
July 1994	*Crossroads*, Meat Market Craft Centre , Melbourne
November 1990	*Patterns of our Dreams*, Wool House, Parkville, Melbourne

SELECTED PUBLICATIONS AND REVIEWS

May 2004	Metis 2004 catalogue
October 2003	Craft Arts International Vol 59, pg 106.
July 2003	Canberra Times, 11.7.03 pg 26
August 2002	indesign: interior architecture product Vol 10 pg32
March 2000	Craft ACT Directory of Accredited Professional Members
1999	Canberra Arts Anthology, National Library of Australia. pg21
Oct 1999	Craft Arts International, No 47 pp 42-45
August 1999	Canberra Times "Panorama" 21.8.99 pg 14
June 1999	Monument (Issue 30) pg 26
May 1999	Artichoke (Issue 2 - magazine of the DIA) pg 11
March 1998	Craft Arts International, (issue 45) pg 96
November 1998	Textile Fibre Forum Vol 17, issue 3 no 53 pg 64 & inside cover.
July 1998	"Domain" Sydney Morning Herald 30.7.98 pg 2

Winter 1998	ANTIPODesign pg 24
February 1998	Ragtrader 23.1.98 - 5.2.98 pg 22
June 1997	"Look" Metro Section The Age 2.6.97
July 1996	Textile Fibre Forum page 32
June/July 1996	Home Decorator pages 25, 80 & 130
March/April 1996	Belle page 22
March /April 1996	Interiors pages 77 & 83
March /April 1996	Vogue Living, pages 67 & 72
March / April 1996	Home Decorator, page 127
January 1996	"Home" The Age 29.1.96

MEDIA

July 2001	"Interiors" CD ROM Object Gallery
3 September 1999	"Snapshot" Canberra ABC TV
26 May 1997	"Healthy, Wealthy & Wise", Channel 10
Filmed July 1996	"Our House", Channel 9

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Batchelor, D. *Chromophobia*. London: Reaktion, 2000.

Baum, L. Frank. "Wizard of Oz." edited by Victor Flemming, 1939.

Benezra, N. , Viso, O.M. *Regarding Beauty : A View of the Late Twentieth Century*. Ostfildern, Germany: Hatje Cantz Publishers in association with the Hirshhorn Museum and Sculpture Garden and the Smithsonian Institute., 1999.

Berg, T. *Thea Bjerg, No 1-44, Textiles*. Copenhagen: Thea Bjerg, 1995.

Byrne, Chris. "Biotechnology in Textiles." Paper presented at the Textile Institute's Dyeing and Finishing Group Conference, Nottingham, UK 1995.

Catts, O., Zurr, I. and Ben-Aryl, G. "Tissue Culture and Art." Paper presented at the Thespacebetween, Curtain University of Technology, Perth 2004.

Craig, Gerry. "Waiting, She Missed Nothing." *Surface Design* 25, no. 2 (2001): 24-27.

De Grandis, Luigina. *Theory and Use of Colour*. Edited by Arnoldo-Mondadori. Poole: Blandford Press, 1986.

Dickey, C. "I Love My Glow Bunny." *Wired* 2001, 88-99.

Doyle, C. "Ecology, Craft and the New Millenium." *Craft Victoria* 1 (1998): 12-15.

Drysdale, B. "Exchange with the Earth." *Surface Design Journal* Fall 1998 (1998): 20-23.

Fitzgerald, A., ed. *An Artist's Book of Inspiration. A Collection of Thoughts on Art, Artists, and Creativity.* New York: Lindisfarne Press, 1996.

Fricke, M. "Tending a Cloth Garden." *Fiberarts Magazine* 21, no. 3 (1995): 29-34.

Gage, J. "Chromatically Challenged." Centre for Cross-Cultural Research, ANU, 26/9/03 2003.

Hoggard, L. "Making History." *Crafts* 170, no. May/June (2001): 42-45.

"Indigo from Microbes." *Textil Forum* 4/2002 (2002): 3.

Jung, C. *Man and His Symbols*. Edited by C and von Franz Jung, M.L. London: Picador, 1978.

Kemal, S., Gaskell, I., ed. *Landscape, Natural Beauty and the Arts.* Cambridge: Cambridge University Press, 1993.

Koren, L. *Wabi-Sabi for Artists, Designers, Poets & Philosophers*. Berkeley, CA.: Stone Bridge Press, 1994.

Levy, E.K. "Repetition and the Scientific Model in Art." *Art Journal* 55, no. Spring 1996 (1996): 79-84.

Macpherson, Robert. *A Proposition to Draw 1973 - 78*: University Art Museum, University of Queensland, 1993.

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Millar, L. "At the Still Point : Time Present and Time Past." In *Portfolio Collection No. 12 : Chiyoko Tanaka*, edited by M. Koumis. Winchester: Telos Art Publishing, 2002.

Minor, V.H. *Art History's History*. New Jersey, USA: Prentice-Hall, Inc., 1994.

Pichois, C. and Ziegler, J. *Baudelaire*. London: Random House, 2002.

Porges, T and Gordon, H. *Portfolio Collection: Anne Wilson No. 6.* Edited by Matthew Koumis. Winchester: Telos Art Publishing, 2001.

Ross, Gary. "Pleasantville." edited by Gary Ross: New Line Cinema, 1998.

Searle, K. "Yardage Revisited." *Surface Design Journal* Spring 2000 (2000): 10-15.

Shaw, Phil. "Phytochromography - Screen Printing with Plants : Research into Alternative Ink Technology." *Leonardo* 32, no. 1 (1999): 33-39.

Sircello, Guy. *A New Theory of Beauty*: Princeton University Press, 1975.

Sorkin, J. "Stain: On Cloth, Stigma, and Shame." *Third Text* 53, no. Winter 2000-01 (2001): 77-80.

Trevillian, A. and Pettifer, J. "Bleach, Buckle and Burn." Canberra: Canberra School of Art, ANU., 1997.

Viso, O. "Beauty and It's Dilemmas." In *Regarding Beauty : A View of the Late Twentieth Century*, edited by N. and Viso Benezra, O.M. Ostfildern, Germany: Hatje Cantz Publishers in association with the Hirshhorn Museum and Sculpture Garden and the Smithsonian Institute., 1999.

Wenders, W. "Wings of Desire." edited by Wim Wenders, 1987.

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