SWEETNESS AND BLIGHT: CONSERVATION OF CHOCOLATE WORKS OF ART

GLENN WHARTON, SHARON D. BLANK & J. CLAIRE DEAN

'I needed something that would assert a really, really primal physicality that would also be on that edge of alluring, delicious and repulsive. And I just thought, yes, chocolate.' - Helen Chadwick[1]

1 INTRODUCTION: CHOCOLATE AS A FINE ARTS MEDIUM

The conservation of chocolate is a messy business. It is a challenging material for conservators not only because of its complex chemistry, but because of its potent symbolism. Artists who work in chocolate have usually chosen it as a medium for very specific reasons. An understanding and respect for the artist's concerns should govern the conservator's approach to chocolate.

The fascination with sculpting in chocolate appears to have begun early after its first manufacture in Europe. (see figure 1.) A surprisingly large number of contemporary artists have incorporated chocolate into their work. Some have sculpted and painted with it to create "permanent" art, while others have melted it, poured it, gnawed it, and licked it during temporary installations and performances.

Figure 1. Advertising trade card from Stollwerck Brothers, 1893. This Renaissance style temple with ten foot tall statue of Germania was composed of 30,000 pounds of chocolate over a wood frame support, and exhibited in the Chicago World's fair, 1893.

Among the artists who have recently employed chocolate as a sculpture medium is Dieter Roth, who has sculpted self portraits in the medium and used it in some of his paintings. Claes Oldenburg has created a number of works with chocolate candies covered with paint. Joseph Beuys has adhered painted chocolates to paper supports.

Many artists have also used chocolate in installation and performance pieces. Why do these artists work with chocolate? Not surprisingly, the answers are as diverse as the artists who have chosen it as a medium. Helen Chadwick associates it with mud and clay and primal soup. She describes it as having 'this smell, sweet, like death, and associations with romance, intoxication and addiction, excess, sickness...excremental pleasure.'[2] Janine Antoni sculpted lipstick containers by gnawing and spitting from 600 pound blocks of chocolate and lard. She has also made chocolate busts of herself, personally licked into shape. Her focus on chocolate is to explore notions of female

sexuality and body image.[3] She refers to the way women experience their bodies, especially as manifested in eating disorders such as anorexia nervosa and bulimia.[4] Similarly, Karen Finley describes chocolate and other materials she applies to herself during performances as representing the violation perpetrated on women's bodies.[5] Paul McCarthy has used chocolate and other foodstuffs in his performances as "paint", with his body as the canvas, to invoke bodily fluids such as blood, semen and excrement.[6] Anya Gallaccio's chocolate painted walls are allowed to alter during the course of the installation, to 'transform the work from something serene and beautiful to something repellent, and yet morbidly alluring'.[7] Edward Ruscha, also seduced by the qualities of chocolate, created a room lined shingle style with 360 chocolate silkscreened papers for the Venice Biennale of 1970.[8]

The public often has a strong reaction to chocolate in art. Many pieces have been vandalized, particularly by biting and licking. Sue Hubbard describes the experience of viewing a phallic chocolate fountain by Helen Chadwick: 'for a chocoholic the smell is as seductive as that of a brewery to an alcoholic. As you enter, it permeates the gallery, sickly-sweet, cloying, drawing you towards the bubbling glutinous mass. The brown liquid pulses from the erect penile center in a constant ejaculation, slurping into the seething pool beneath. It is every wickedness and excess rolled into one. Other allusions encompass over indulgence, a regressive Freudian interest in coprophilia, a comment on first-world uses of the third-world resources (cocoa is a major third-world export), and the poisonous pollution of the planet with noxious industrial effluvia, within a delightfully witty and seductive context.'[9]

Our contemporary symbolism and associations with chocolate have been attributed to cocoa throughout its history. The Aztecs believed that Quetzalcoatl, who was born of a god and a virgin mortal, brought the cocoa bean from heaven. They believed that chocolate brought universal wisdom and knowledge. When cocoa was imported to Europe, it was promoted as a medicine that would cure all ills. The Spaniards referred to the beverage as a "divine drink", which offered resistance to disease and guarded against fatigue. Casanova claimed that it was an inducement to romance. The word "chocolate" is apparently synthesized from a combination of the words *choco* (foam) and *tatl* (water). In 1753, the Swedish botanist Carolus Linnaeus named the cocoa tree *Theobroma cacao*, Greek for "food of the Gods".

2 CHOCOLATE HISTORY

The cocoa bean, from which chocolate is derived, was first cultivated by the Mayans about 600 A.D. when it was brought to the Yucatan from the Amazon or Orinoco valleys of South America. The Aztecs later planted cacao trees throughout Central America. They ground the beans into a fine powder, then mixed it with water to make a frothy, bitter drink called *chocolatl* by the Aztecs, and *xocoatl* by the Mayans.

The Spanish explorers encountered the chocolate beverage in the sixteenth century. The Aztec Emperor Montezuma provided Cortéz with lavish banquets where chocolate

beverages were served. Cortéz carried cocoa beans back home, thereby introducing chocolate to Spain, where sugar was eventually added to the drink. The secret of its preparation was guarded for nearly a century.

Eventually, a taste for hot chocolate spread to Italy, Germany and France. As an expensive luxury, fashionable chocolate houses developed during the seventeenth century in the major capitals of Europe. In about 1700, the English further improved the drink by adding milk. This greatly reduced the price of the beverage, which led to more widespread consumption. The first chocolate bar is thought to have been made in England in 1847. Over time, various recipes developed by combining cocoa butter, cocoa liquor, sugar and other additives.

3 CHOCOLATE MANUFACTURE

A full description of chocolate manufacture may be found in the many texts on chocolate processing (see reference section.) In essence, the cocoa beans are harvested from the cocoa tree and allowed to ferment. The beans are then dried and cleaned prior to roasting. It is in the fermentation and roasting that the true art of chocolate manufacture lies, for this is where the chocolate flavor is developed. After roasting, the cocoa bean nib is ground to produce a coarse but flowing substance known as cocoa liquor.

At this point, various production processes take place depending on the desired product. Cocoa liquor may be pressed to extract the cocoa butter (a naturally occurring fat), then dried into a cake and ground to produce cocoa powder. If baking chocolate is to be made, the butter is not removed and the liquor is allowed to harden to a solid. Sweet chocolate (including semi-sweet and bitter chocolate) is cocoa liquor to which sugar and additional cocoa butter are added. Milk chocolate includes the addition of milk or milk solids. The shelf life of chocolate depends mainly on the way in which the fat in the newly made liquid chocolate is tempered and cooled.

Of course chocolate is not only tempered, but tampered. There are no internationally accepted standards for what ingredients can be added and still be marketed as chocolate. The exact same product that can be sold as chocolate in one country may have to be called 'chocolate flavored' if manufactured and retailed elsewhere. That blasphemous product, 'white chocolate' has only sugar, milk, and cocoa butter, with no cocoa liquor at all. Even farther removed are products such as confectionery coating, which may contain wax and an astonishing variety of vegetable fats. Of the materials added to cocoa liquor to make chocolate, the sugars and fats are of most concern to the conservator. One must be prepared to encounter sugars of all forms and fats other than cocoa butter.

4 CHOCOLATE CHEMISTRY

Chocolate is a complex organic material, one that modern manufacture has increased in its complexity. To the cocoa liquor, already a rich stew of organic molecules, a wide variety of fats, sugars, flavorings, preservatives and emulsifiers have been added.

Structurally, chocolate is an aggregate with solid bits of sugars and cocoa beans surrounded by a fatty layer or "binder". This structure accounts for many of the phenomena observed in working with chocolate. The fat based binder, ideally cocoa butter, but too frequently a nasty admixture of cheapening ingredients, allows the chocolate to flow during production, but also contributes mightily to the all important "mouth feel" of the chocolate.

The fermentation and roasting of the cocoa bean creates a fragrant array of over five hundred different molecules and a significant amount of acid. The primary acid is acetic, most of which is volatilized during processing, although enough acid can remain in chocolate to accelerate degradation of the wrappings and inclusions. The flavor of chocolate changes after manufacture, actually reaching its peak after a few months, as some of the molecules which create a bitter or sour taste escape. The loss of chocolate taste becomes noticeable after about a year, as more of the many organic molecules that create chocolate flavor are lost to the air and through oxidation. The interior of a chocolate belies that smooth, unperturbed surface. There is an astonishing amount of migration occurring on a molecular level. Volatile flavor molecules and fats migrate out, undesirable outside flavors and smells migrate in.

Perhaps some of the most interesting trace molecules found in chocolate are those capable of affecting our physiology. The phenylethylamine component of chocolate experienced its fifteen minutes of fame when it was found to be present in large amounts in the brain of those in passionate love, and not detectable after falling out of love. Although there was a brief rush on chocolate by chemically minded suitors hoping to induce a state of ardor in their beloved, phenylethylamine was subsequently found not to be psychoactive when eaten. Theobromine, on the other hand has a very profound effect on the canine community. It stimulates the heart and decreases blood flow to the brain in dogs. A pound of chocolate can be lethal to a twenty pound dog. In humans, large doses of theobromine have been known to cause headaches.

Chocolate is primarily defined by its fat content. Cocoa butter has six crystalline forms, the most physically stable of which is the beta form, with a melting point of 34.5°C. Chocolate is tempered to increase the percentage of the beta crystals. Tempering heats the chocolate to 48°C, at which point it is completely melted. The chocolate is then cooled to allow the formation of crystals and avoid bloom formation, and then slowly heated to a temperature, 32°C, at which only the beta form remains. Thus seeded, the cocoa butter will be primarily in the beta state. One can begin to grasp the extreme degree of temperature control required in the many steps leading to a finished chocolate.

As one may suspect, emulsifiers are often added to chocolate, lecithin being the most commonly used. However manufactures may add up to 1% surfactant in their efforts to produce a smooth, stable chocolate that resists chocolate bloom.

Chocolate bloom (or fat bloom) is the result of exposure to warm temperatures and other phenomena which allow the less stable fractions of the cocoa butter (or other fats) to migrate to the surface of the chocolate. Bloom signifies dire consequences within the chocolate. In addition to the unattractive appearance created by the bloom, the structure of the chocolate itself has been weakened. In the most advanced cases, the fatty binder that once held the solid particles together has been lost, the plasticiser that gave the chocolate its flexibility and resilience is no longer in place. The resulting material is a powdery, crumbling mass. Milk chocolate is not as susceptible to bloom.

Figure 2. Fat bloom deposits on a chocolate sculpture of a cocoa bean. Presented to Chocolate Historian William Mobley by the Chocolate Lovers Hall of Fame in 1990.

A more innocuous type of deterioration is sugar bloom. Sugar bloom is the relatively rare, but unsightly and grainy white deposit that may form on the surface of chocolate as the result of exposure to high humidities or moisture. Water allowed to condense on the surface of chocolate will draw the sugar out of the chocolate, and deposit it on the surface.

How long will chocolate "keep"? Stored under ideal conditions, it will remain edible for at least ten years. Cocoa butter is among the most stable fats, and chocolate at low humidities is prone to few biological pests, discounting the human and canine varieties. Chocolate keeps astonishingly well, and is more stable than many of the materials used by contemporary artists. Although there is loss of flavor and various oxidation products will have developed, including fatty acids, the chocolate can still be structurally sound. Trace metallic contaminants, primarily iron and copper serve as catalysts to degradation, as they will for many organic materials.

The presence of inclusions can also contribute to the degradation of chocolate. Inclusions are frequently the point of attack for insect and mold infestations. Nuts are probably the worst offender when it comes to fatty bloom, for the oils from the nuts tend to migrate out through the chocolate layer; fatty biscuits will do the same thing. Absorbent materials such as marshmallow have exactly the opposite effect, sucking fats out of the chocolate. High moisture centers can shrink with age or cause sugar bloom. Hard centers which do not allow the chocolate to expand and contract with temperature changes will cause cracking in the chocolate enrobing. Centers that have become hosts to bacteria can literally burst with fermentation products. Weak points in the chocolate coating, poor seams or thin walls, are focal points for releasing the stress of containing the center. Cracking of the coating only increases with time as the chocolate becomes more brittle. Liqueur centers are prone to the escape of alcohol through the chocolate, and leeching of sucrose to the surface. Armed with this knowledge, a conservator may come to view a box of mixed chocolates as a ticking time bomb.

A basic understanding of the artists intent is fundamental to the conservation of all modern and contemporary works of art, and chocolate is no exception. Some artists, such as Joseph Beuys, incorporate time into their work, thus allowing self destruction to be part of the piece. For other artists, such as Dieter Roth, Helen Chadwick and Janine Antoni, the edibility or aroma of foodstuffs is critical to their conception.

It is difficult for conservators to refrain from consolidating, filling and inpainting, since these techniques are at the core of their training. Fortunately there is a growing body of conservation literature which help conservators navigate between professional ethics and respect for the artists intent. Heinz Althöfer has written about the conservation of decaying works of art, arguing that great demands are made on the conservator to correctly interpret objects made from found and deteriorating materials.[10]

As conservators we are often concerned with preserving the appearance of a work of art. This focus on appearance is appropriate for traditional art with which the viewer's experience is purely visual. More complex issues are presented by functional objects, where much of the meaning lies in the very functionality. If functional objects are preserved but not allowed to function, then arguably, the intent of the object has been lost. Conversely, if the object is allowed to function, but is destroyed in the very functioning, then we have lost that object for posterity. Although these issues are raised with the preservation of all but the most traditional of art forms, with edible art they are raised to new poignancy.

If the process of deterioration is considered integral to the work of art, as is the case with Dieter Roth, Joseph Beuys, and others, physical interference with this process may be considered inappropriate. In a visit to the Tate Gallery, Dieter Roth was asked about his paintings which were actively deteriorating. His reply was that he expected the paintings to deteriorate and, that, although it should not be encouraged, they should be allowed to do so. 'The idea and not the object' should be preserved. In the process of investigating one of his paintings, he poked his finger in a chocolate element, which he sniffed to identify.[11]

Other artists have accepted modifications of their work by the public. Teeth marks appeared during the exhibition of Lisa Brown's chocolate cast of her own body. The artist decided to leave the teeth marks, saying "nothing's sacred."[12]

The nature and extent of modification may influence whether the artist accepts it or not. According to Janine Antoni, 'When I showed Lick and Lather in Venice, a 16-year old schoolgirl bit off three of my noses.' The artist had thought about biting the noses off herself, but decided not to do it. The incident caused her to take the vandalized sculptures off display.[13]

In addition to respecting the intent of the artist, conservators should protect themselves by being aware of local legislation governing the rights of artists and their estates. In the United States, both federal and state laws protecting artists and their estates exist, but

their validity regarding foodstuffs in art has not been tested in the courts. The law has in fact been hesitant to allow copyrighting of anything that is edible. If an artist could copyright a chocolate sculpture, it would be difficult to prevent a chocolatier or indeed a chef from copyrighting their specialized desserts. The distinction between fine art, craft, and culinary art is indeed a fine line.[14]

There have been a number of law suits regarding the alteration of works of art by well meaning custodians. Among these is a suit filed against the Düsseldorf Academy brought by Johannes Stuttgen over the destruction of a Joseph Beuys' sculpture 'Fettecke'.[15] The cleaning crew of the Academy removed an eleven pound glob of fat and felt from a wall installation which Beuys had created.

Prior to performing a major conservation treatment on a deteriorated chocolate work of art, the conservator should strive to obtain a written statement of intention from the artist or their representative. Preventative measures should be taken to slow the deterioration of chocolate by exhibiting and storing it in a stable environment, and establishing good housekeeping policies for control of pests.

7 ENVIRONMENTAL CONTROLS

Unquestionably, the most important factor in chocolate preservation is the maintenance of a cool environment. As previously mentioned, exposure to elevated temperatures will induce internal migration of fats within chocolate. It follows that chocolate should not be handled for an extended length of time because of this sensitivity to temperature. A storage environment that has been suggested for the ultimate preservation of chocolate is a heat-sealed plastic envelope with a nitrogen atmosphere, deep frozen at minus 20˚C.[16] In the chocolate industry, 16 to 20˚C is generally accepted as a standard. Lower temperatures of 8 to 10˚C controls have been proposed in the industry, but these temperatures necessitate very careful control of relative humidity. A stable temperature of 20˚C is recommended as realistic for the museum environment.[17]

The moisture content of the air is less critical to chocolate than temperature, although excessive moisture may cause partial dissolution of sugar and surface redeposition, known as sugar bloom. High levels of moisture may lead to mold formation. A relative humidity of below 50% has been recommended for museums.[18]

Figure 3. Detail of 'Two Frauleins with Shining Bread' by Joseph Beuys, 1966. The surface of the painted chocolate has developed fat bloom. A fatty acid liquid exudent has stained the paperboard which the chocolate is mounted on.

In 1990, samples from the painted chocolate component of 'Two Frauleins with Shining Bread' by Joseph Beuys was brought to the Canadian Conservation Institute for analysis of deterioration products (see figure 3.) The work was analyzed by R. Scott Williams.[19]

The object was left untreated by the conservators of the Art Gallery of Ontario, in keeping with the artist's intent.[20] [21] It was placed in a permanent display case with very little air volume, at ambient gallery environmental conditions of 45% (plus or minus 5%) relative humidity and 21˚C.

8 CHOCOLATE PESTS

Who can blame the large range of pests that are attracted to chocolate? The best method of avoiding pests is good housekeeping. Regular cleaning and inspection are essential for any collection prone to insect attack. Infested objects should be quarantined and the insect identified. If possible, contact should be made with the artist or artist's agent. Fumigation of a chocolate work of art with toxic substances will render it inedible, which may be in direct conflict with the artists intent. Controlled freezing may risk water condensation on the surface of the chocolate. If freezing is the most practical option, careful use of dessicants will reduce condensation during thawing. Oxygen deprivation through exposure to nitrogen, carbon dioxide or AGELESS™ may be safely employed.[22] [23] [24]

Figure 4. 'Earthquake' by Claes Oldenburg, 1969. The sculpture was infested twice in recent history. First by cigarette beetles, then by varied carpet beetles. The beetles bored entrance and exit holes and ingested most of the chocolate.

Claes Oldenburg's 'Earthquake' (see figure 4) was constructed as a model for a ride at Disneyland, where giant chocolate bars would shift precariously, crack open and settle back. It consists of a pile of Hershey Almond Chocolate bars with enamel paint and polyurethane resin poured over them. After an initial infestation by cigarette beetles, *Lasioderma serricorne*, the owner was left with the fragile shell of enamel paint and polyurethane, as well as thousands of carcasses (larvae) and a mountain of frass (reprocessed chocolate). It was decided to eradicate the insects by controlled freezing.[25] Exacerbated by storage in a humid environment, the sculpture suffered a second infestation by varied carpet beetles, *Anthrenus verbasci*. The owner and conservator decided to fumigate the sculpture on the second occasion with methyl bromide.

Heinz Althöfer at the Düsseldorf Restoration Center has refused to treat an infested chocolate bust by Dieter Roth because it would render it inedible (see figure 5.) The piece is being kept under a Plexiglas (poly methyl methacrylate) cover in the conservation laboratory. 'I don't know how long it will take' he said, 'but one of these days all we'll have left is a pile of powdery chocolate, and eventually that too will be gone. They'll eat it.'[26]

Figure 5. Chocolate self portrait by Dieter Roth. Insect infestation observed by conservator Heinz Althöfer.

A sculpture by Dieter Roth containing yogurt and one by Anselm Kiefer incorporating poppy seeds arrived at the National Gallery of Art in Washington with pests. The artists and their agents were consulted, and neither artist was displeased upon learning about the infestation. In both cases a compromise treatment was reached. The Roth was fumigated, but the insect carcasses, frass and other detritus were preserved in-situ. The poppy seeds in the Kiefer will be removed, frozen and replaced.[27]

9 CHOCOLATE CONSERVATION TECHNIQUES: THE THEORY

The use of traditional conservation materials for cleaning, adhesion, gap filling and consolidation of chocolate is limited because of the sensitivity of sugar and fat to most classes of solvents. The selection of conservation materials should be based on the specific materials employed in the work of art, their condition, and the results from testing in small areas. The application of all solvents and heat should be used with caution.

Chocolate, being an emulsion of sorts, is soluble in a wide range of solvents. The sugar is affected by extremely polar water, and the organic portions, primarily fat, are affected by less polar solvents. Theoretically, the somewhat polar vegetable fats in chocolate should be unaffected by non polar solvents. However, a test of the solubility properties of an unaged semi-sweet chocolate revealed solubility in petroleum distillates, throwing theory out the window and wasting a perfectly good piece of chocolate. Chocolate never has an opportunity to age in our testing facility, thus precluding testing the solubility of aged fats. As the fats in chocolate oxidize with time, they effectively become more polar, and thus may be unaffected by non-polar solvents.

The high mobility of materials within the chocolate matrix may pose additional problems for the conservator. Not unlike efflorescence in stone or porous ceramics, fats and sugars may crystallize under coatings and force them from the surface. Adhesives may be plasticized by fats from the chocolate, and molecules from conservation materials may be found to migrate deep within the chocolate.

Adhesives and consolidants from the conservator's traditional arsenal are all likely to be effective at adhering to chocolate due to the range of functional chemical groups to be found within the matrix. The question of how much harm is done is a sticky one. The presence of solvents or even solvent vapors can be expected to increase the mobility of the fats, as the crystalline structure will be disrupted. The deleterious effects of water are well known.

Application of warmed confectionery coatings or wax provides an interesting question, that of disruption to the crystalline structure of the fats. The degree to which this is a problem is unclear. The authors are unaware of studies of the crystalline forms present in

aged chocolate, and given the confectionery industry obsession with freshness, such a study seems improbable. However, technical examination of a freshly made, tempered chocolate found only 50% of the stable beta form of cocoa butter. One suspects the percentage in an aged, degraded chocolate exposed to a range of temperatures would be significantly lower. Thus, again at the risk of mobilizing fatty components, heat below the 32˚C melting point of beta prime should not further destabilize the crystalline structure.

10 CHOCOLATE CONSERVATION TECHNIQUES: THE PRACTICE

The cleaning of chocolate art may include the removal of sugar bloom, fat bloom, accretions from oozing cream filled interiors, and superficial dust and soiling. A clean, soft bristle brush, possibly aided by low vacuum pressure should be employed to removed dust and bloom that is not well adhered. Pointed wood or plastic skewers and tweezers may assist in removal of more tenacious deposits.

Despite the temptation to simply lick the problem, the use of any solvent should be carefully tested prior to use. In some cases, minimal use of de-ionized water, saliva, ethanol or a clean petroleum solvent such as Naphtha VM&P solvent on a small cotton swab may be appropriate. The use of any of these solvents may cause the surface to partially dissolve. Water may induce the formation of sugar bloom. As Helen Cox warns, 'Wet cleaning should be avoided where chocolate has become friable and open textured, as the solvent may migrate into the structure and cause sub-surface melting.'[28]

Figure 6. Detail of 'Chocolates' by Claes Oldenburg, late 1960's. Expansion of cream filled interior caused surface paint to crack. Reprecipitated sugar was deposited on the surface of two of the candies.

An example of chocolate cleaning was the removal of reprecipitated sugar from a painted chocolate surface by gently scraping with wood skewers.[29] 'Chocolates' by Claes Oldenburg consists of cream filled Black Magic candies (Rountree manufacture) in their original plastic container which is adhered to a cardboard support and set on green velvet covered pressed wood (Masonite.) The candies are covered with brown enamel paint. The cream fillings had oozed out of two of the candies, and deposited white reprecipitated sugar on the surface of the paint.

A wide range of adhesives bond well to chocolate, including acrylics, acrylic emulsions, and wax. Soft, powdery surfaces of broken edges may require pre-consolidation prior to adhesion of chocolate. As with cleaning, limitations are posed primarily by the sensitivity of chocolate to heat and most solvents, including water.

If water, alcohol and acetone based adhesives cannot be used because of the risk of damage to the object, microcrystalline wax may be considered as an adhesive or fill material. Its tackiness may be adjusted by selection of a wax with an appropriate melting point or modification with a small amount of polyethylene wax.

Because of the narrow range of options imposed by chocolate, the use of high quality chocolate has been suggested as an adhesive by Helen Cox.[30] Cadbury's 'Bournville' plain chocolate was used to repair a broken pair of chocolate pliers from a set of Victorian chocolate carpentry tools at the Doncaster Museum Conservation Laboratory.

Most of the chocolate in Claes Oldenburg's sculpture 'Earthquake' had been eaten by insects (see figure 4).[31] The voids were filled with brown pigmented wax to simulate chocolate. A low melting point microcrystalline wax was gently manipulated into the entrance and exit holes bored into the hollow shell of paint by the insects. The wax was applied in a warmed and soft state, rather than a liquid state, in order not to affect the fragile shell of paint. The treatment was approved by the artist, who jokingly requested that the wax be strawberry scented if possible.[32]

11 CONCLUSION

As we have seen, chocolate is a stimulating material for the artist as well as the conservator. It has enjoyed an elevated status throughout its history, from its divine associations in Mayan and Aztec cultures to its symbolic use in contemporary art installations. The conservator must approach chocolate art with an understanding of the individual artist 's philosophy and intent. Recognition of the artists intent may force the conservator to consider preservation secondary to other issues. In some instances, a traditional conservation approach to eradicate pests, consolidate, fill and inpaint may be in direct contradiction with the artist's concept. Because of the sensitivity of chocolate to most solvents, the choice of any conservation material must certainly be made after careful ~~tasting~~ testing. Since few active treatments are suitable for chocolate, emphasis should be placed on preventative conservation measures, such as good storage methods, handling procedures and pest management programs.

REFERENCES

1. Alberge, Dalya. Chocolate nude proves good enough to eat. *The Times* . London. July 22, 1994.
2. Alberge, Dalya. Tasty art exhibit doomed to rot. *The Independent*. January, 1994.
3. Althöfer, Heinz. Fragment und Ruine. *Kunstforum International*. 19, n.1. January 1977. pp. 57-170.
4. Cox, Helen. The Deterioration and Conservation of Chocolate from Museum Collections. *Studies in Conservation*. 38. 1993. pp. 217-223.
5. Cruikshank, David. Conservation of Chocolate. *SSCR Journal*. 5. n.1 February, 1994. pp. 6-8.
6. Daniel, Vinod, Hanlon, Gordon, and Maekawa, Shin. Eradication of Insect Pests in Museums Using Nitrogen. *WAAC Newsletter* 15 n.3. September, 1993. pp. 15-19.
7. Dornberg, John. Beuys Butter Battle. *ARTnews*. 88. n.4. April, 1989. p.23.
8. Dornberg, John. Intensive Care. *ARTnews*. 90. n.1. January, 1991. pp. 128-133.
9. Fielding, Helen. Part of sleep's rich tapestry. *The Independent*. March 27, 1994.
10. Florian, M. E. The Freezing Process: Effects on Insects and Artifact Materials. *Leather Conservation News*. 3. 1986. pp. 1-17.
11. Fuller, Linda K. *Chocolate Fads, Folklore, & Fantasies: 1,000+ Chunks of Chocolate Information*. The Haworth Press. New York. 1994. 276 pp.
12. Gaither, Rowan. A sculptor's gnawing suspicions. *New York*. 25. n.10. March, 9, 1992. p.24.
13. Gilberg, M. Inert Atmosphere Disinfestation Using AGELESS Oxygen Scavenger. *ICOM Committee for Conservation Ninth Triennial Meeting*. Dresden. 1990. pp. 812-816.
14. Hachiya, I., Koyano, T., Sato, K., Observation of Seeding Effects on Fat Bloom of Dark Chocolate. *Food Microstructure*. 8, 1989. pp. 257-261.
15. Hubbard, Sue. The pulse of brown liquid. (Helen Chadwick, Serpentine Gallery, London.) *New Statesman & Society*. 7. n.313. July 29, 1994. p.34.
16. Jensen, H.R. *The Chemistry Flavoring and Manufacture of Chocolate Confectionery and Cocoa*. P. Blakiston's Son & Co., Inc. Philadelphia, 1931. pp. 1-212.
17. Jordan, Stroud. *Chocolate Evaluation*. Applied Sugar Laboratories. New York. 1934. pp. 1-113, 380-399.
18. Kuspit, Donald B. Beuys: Fat, Felt and Alchemy. *Art in America*. 68. May, 1980. pp. 79-89.
19. Lees, R., & Jackson, E.B. *Sugar Confectionery and Chocolate Manufacture*. Leonard Hill Books. 1973. pp. 45-65, 119-159
20. Lubbock, Tom. Bubble, bubble, toil and trouble. *The Independent*. London. July 26, 1994. p.21
21. Mehrtens Galvin, Ruth. Sybaritic to some, sinful to others, but how sweet it is!. *Smithsonian Magazine*. January 9, 1995. pp. 54-64.
22. Othmer, Kirk. *Encyclopedia of Chemical Technology*. John Wiley & Sons, Inc. 1979. Third Edition. V.6.

23. Rowntree plc. York, U.K. Public information package on chocolate, its history and production. 1988.
24. Rutgoff, Ralph. Dark art: a new generation of British sculptors is finding inspiration in the morbid and macabre. *Vogue*. 182. n.9. September, 1992. p352. (3 pages.)
25. Sante, Luc. Blood and Chocolate. *The New Republic*. 203. n.16. October 15, 1990. pp. 34-38.
26. Schwendenwien, Jude. Cravings: Food Into Sculpture. *Sculpture*. 11. November-December, 1992. pp. 44-49.
27. Stone, Judith. Life Styles of the Rich and Creamy. *Discover*. September, 1988. pp. 81-83.
28. Taylor, Simon. Janine Antoni at Sandra Gering. *Art in America*. 80. n.10. October, 1992. p.149.
29. Turim, Gayle. A Bonbon-anza of Beautiful Paper: A New York chocoholic has compiled a delectable collection of ephemera related to his candy of choice. *Americana*. August, 1990. pp. 51-54.
30. Vincent, Sally. Sweet excess. *The Sunday Times*. London. July 24, 1994.
31. Williams, R. Scott. Exudations on 'Two Frauleins With Shining Bread.' *CCI Analytical Report No. ARS 2907 File No. 5070-1*. July 9, 1990.
32. U.S. Department of Commerce. *Confectionary Industry Report*. Washington, D.C. 1993.
33. Young, Gordon. Chocolate: Food of the Gods. *National Geographic Magazine*. 166, n.5. November, 1984. pp. 664-686.

Additional information was obtained through personal communications:
1. Landell Mills Commodities Studies, Oxford, U.K.
2. Chocolate Manufacturers Association, McLean, Virginia, U.S.

PHOTOGRAPH CAPTIONS

Figure 1. Advertising trade card from Stollwerck Brothers, 1893. This Renaissance style temple with ten foot tall statue of Germania was composed of 30,000 pounds of chocolate over a wood frame support, and exhibited in the Chicago World's fair, 1893.

Figure 2. Fat bloom deposits on a chocolate sculpture of a cocoa bean. Presented to Chocolate Historian William Mobley by the Chocolate Lovers Hall of Fame in 1990.

Figure 3. Detail of 'Two Frauleins with Shining Bread' by Joseph Beuys, 1966. The surface of the painted chocolate has developed fat bloom. A fatty acid liquid exudent has stained the paperboard which the chocolate is mounted on.

Figure 4. 'Earthquake' by Claes Oldenburg, 1969. The sculpture was infested twice in recent history. First by cigarette beetles, then by varied carpet beetles. The beetles bored entrance and exit holes and ingested most of the chocolate.

Figure 5. Chocolate self portrait by Dieter Roth. Insect infestation observed by conservator Heinz Althöfer.

Figure 6. Detail of 'Chocolates' by Claes Oldenburg, late 1960's. Expansion of cream filled interior caused surface paint to crack. Reprecipitated sugar was deposited on the surface of some of the candies.

PHOTOGRAPH CREDITS

Figure 1. Stollwerck Brothers trade card. Collection of William Frost Mobley, Chocolate Historian, Schoharie, New York.

Figure 2. Chocolate sculpture of cocoa bean. Anonymous. Collection of William Frost Mobley, Chocolate Historian, Schoharie, New York.

Figure 3. 'Two Frauleins with Shining Bread' by Joseph Beuys, 1966. Art Gallery of Ontario, Toronto. 74.7 x 20.9 cm. Gift from the Junior Committee Fund, 1990. Accession Number 90/89.

Figure 4. 'Earthquake' by Claes Oldenburg, 1969. Collection of Maurice Tuchman.

Figure 5. Chocolate self portrait by Dieter Roth. VISUM/TIMM RAUPERT.

Figure 6. 'Chocolates' by Claes Oldenburg, late 1960's. Collection of William J. Hokins.

FOOTNOTES

---

[1] Vincent, Sally. Sweet excess. *The Sunday Times*. London. July 24, 1994.

[2] Vincent, Sally. Sweet excess. *The Sunday Times*. London. July 24, 1994.

[3] Fielding, Helen. Part of sleep's rich tapestry. *The Independent*. March 27, 1994.

[4] Schwendenwien, Jude. Cravings: Food Into Sculpture. *Sculpture*. 11. November-December, 1992. pp. 44-49.

[5] Sante, Luc. Blood and Chocolate. *The New Republic*. 203. n.16. October 15, 1990. pp. 34-38.

[6] Personal communication with the artist on January 9, 1995.

[7] Alberge, Dalya. Tasty art exhibit doomed to rot. *The Independent*. January, 1994. As described by the Karsten Schubert Gallery.

[8] Personal communication with Pat Poncy of Edward Ruscha's studio, January 9, 1995.

[9] Hubbard, Sue. The pulse of brown liquid. (Helen Chadwick, Serpentine Gallery, London.) *New Statesman & Society*. 7. n.313. July 29, 1994. p.34.

[10] Althöfer, Heinz. Fragment und Ruine. *Kunstforum International*. 19, n.1. January 1977. pp. 57-170.

[11] Tate Gallery Conservation Record, interview with artist in 1977.

[12] Alberge, Dalya. Chocolate nude proves good enough to eat. *The Times* . London. July 22, 1994.

[13] Fielding, Helen. op. cit.

[14] This information on U.S. laws regarding artists rights was synthesized from personal communication with Ann M. Garfinkle and Janet Fries on January 4, 1995, of Garfinkle & Associates, Attorneys at Law, 1100 New York Avenue, N.W. Suite 630, Washington D.C. 20005-3934.

[15] Dornberg, John. Beuys Butter Battle. *ARTnews*. 88. n.4. April, 1989. p.23.

[16] Cruikshank, David. Conservation of Chocolate. *SSCR Journal*. 5. n.1 February, 1994. pp. 6-8.

[17] Cruikshank, David. Ibid. pp. 6-8.

[18] Cruikshank, David. Ibid. pp. 6-8.

[19] Williams, R. Scott. Exudations on 'Two Frauleins With Shining Bread.' *CCI Analytical Report No. ARS 2907 File No. 5070-1*. July 9, 1990.

[20] Personal communication with the conservator, Barry Briggs, on January 3, 1995. Art Gallery of Ontario, 317 Dundas St., West, Toronto, Canada M5T 1G4. To further understand the dynamics of the materials which Beuys employed, the conservator created three different samples of similar milk chocolate candies, one with no paint, one with paint on the top, and one with paint on the top and the bottom. Since September, 1991, the surfaces of the chocolate have developed light spots, which could relate to differences in content distribution. Otherwise the samples are in good condition.

[21] A discussion of Beuy's interest in both physical and metaphysical change in his work may be found in: Kuspit, Donald B. Beuys: Fat, Felt and Alchemy. *Art in America*. 68. May, 1980. pp. 79-89.

[22] Florian, M. E. The Freezing Process: Effects on Insects and Artifact Materials. *Leather Conservation News*. 3. 1986. pp. 1-17.

[23] Daniel, Vinod, Hanlon, Gordon, and Maekawa, Shin. Eradication of Insect Pests in Museums Using Nitrogen. *WAAC Newsletter* 15 n.3. September, 1993. pp. 15-19.

[24] Gilberg, M. Inert Atmosphere Disinfestation Using AGELESS Oxygen Scavenger. *ICOM Committee for Conservation Ninth Triennial Meeting*. Dresden. 1990. pp. 812-816.

[25] The sculpture was wrapped with several layers of paper, placed in a cardboard box, then frozen for forty eight hours at -15˚C. They were thawed for twenty four hours at room temperature before repeating the freezing cycle for forty eight hours. The paper and cardboard were used to prevent the precipitation of moisture on the surface.

[26] Dornberg, John. Intensive Care. *ARTnews*. 90. n.1. January, 1991. pp. 128-133.

[27] Personal communication, January 6, 1995, with Shelley Sturman, Head of Object Conservation, National Gallery of Art, Washington, D.C. 20565. Treatment of Dieter Roth, 'Insel' 1968, (Vogel promised gift), was performed by Judy Ozone, Object Conservator. Treatment of Anselm Kiefer, 'Poppies and Memories' 1989, (1994.75.1) is pending approval by the Board of Trustees.

[28] Cox, Helen. The Deterioration and Conservation of Chocolate from Museum Collections. *Studies in Conservation*. 38. 1993. pp. 217-223.

[29] Treatment performed by Wharton & Griswold & Associates, INC. in 1989.

[30] Cox, Helen. op. cit. p. 221

[31] Treatment performed by Wharton & Griswold & Associates, INC. in 1989.

[32] Personal communication with the artist. 1989.