

Title: *Resist*

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Measurements: Bust: 34" Waist: 28" Hips: 36"

Resist interrogates the productive tension of dye penetration using clamped shibori, batik and natural dyeing techniques on silk dupioni and charmeuse. The design is dynamic and changes with wear and exposure to light, washing, and the moving body by using two natural dyes known for poor fastness of color - turmeric (*Curcuma longa*) and indigo (*Indigofera tinctoria*) – in addition to madder root (*Rubia tinctorum*). Aluminum sulfate at 6% owf was used as a mordanting agent for turmeric and madder dyes. While mordanting preserves some fastness of color, the blues and yellows in the jacket/dress ensemble will slowly fade into subdued colors that remain luminescent because of the shape of the silk fiber. In imagining sustainable futures, my design research asks: What new aesthetic possibilities arise when we re-think attachments to constancy of color and embrace the spontaneity of degradation, change and metamorphosis?

While natural dyeing is a newly growing area of interest among hobbyists and fashion/textile designers in Europe and North America, it has been practiced for thousands of years in civilizations across the globe. For example, archaeologists have found evidence of natural colorants and mordants in textile fragments from the Harappan Period of the Indus Valley Civilization (2600 – 1900 BC) (Kenoyer 2004). Other naturally dyed textiles have been recovered from Egyptian tombs and in more recent history natural dye methods were highly developed in places like India where textiles were an important trade material through the late 18th century (Wendt 2009). While synthetic dyes successfully supplanted natural dyes in the mid-19th century, today's designers and consumers are concerned by the potential hazards of synthetic dyes, both in terms of environment and human health (Haar et al. 2013; Siva 2007). Cultivation of dye plants, insects and mollusks continues in some parts of the world today and dye gardens are springing up across North America. Scientists and popular media have suggested that some dyes may have protective or healing properties (Ghoreishian et al. 2013; Cooney 2011). In India Ayurvedic cloth is produced using dye extracts from medicinal plants to improve the mental and physical health and well-being of the wearer. Turmeric is touted by Ayurvedic practitioners as antimicrobial, and these claims have also been evaluated by the scientific community. Ghoreishian et al. found that turmeric dyed fabrics protected against *S.aureus* and *E.coli*, exhibiting "excellent antibacterial activity" with the use of a copper sulfate mordant (3% WOG) and 30% WOG turmeric (Ghoreishian et al. 2013: 206). The potentially healing and protective qualities of naturally dyed textiles make it an important area of design research to pursue. Our clothing is our most immediate environment and our skin the largest organ in the human body: we have a responsibility as designers of sustainable futures to create fashions with human health and wellness in mind.

Natural dyeing is an ancient practice with exciting new possibilities in the modern world. *Resist* uses resist dyeing techniques to celebrate the unique and at times uncertain and unstable nature of natural dyes. My design process begins with the coloring of a textile. In this process, I am concerned with how the dyeing/printing techniques affect the environment as well as human health of the wearer and producer. For this ensemble I used silk for a number of reasons. Firstly, it is a protein fiber with an affinity for natural dyes. Colors appear vibrant on silk in part because of the shape of the fiber and its ability to refract light. Because color change is conceptually and aesthetically important to my design, some colors will fade but never become dull or drab because of the fiber's inherent luminescence. Secondly, silk is a natural fiber and biodegradable. Thirdly, sericulture and silk manufacture has a relatively minimal environmental impact as compared to other natural and man-made fibers (Slater 2003: 29).

A range of colors were created using three natural dyes: turmeric (*Curcuma longa*), indigo (*Indigofera*), and common madder (*Rubia tinctorum*). Indigo is a substantive dye, while turmeric and madder are both non-substantive, which means that they require a metallic mordant to create an affinity between fiber and dye. The process began with a warm wash cycle of fabrics using Synthrapol, a pH neutral detergent. The fabric was hung to dry, and the dry weight was later recorded. The textiles were then mordanted with a bath of 6% owf aluminum potassium sulfate. Batik wax was prepared using a 50/50 combination of paraffin and beeswax and applied to the textiles. Because the wax could melt off in a hot dye bath, the turmeric and madder baths both remained cold, while the indigo bath was heated only as high as 80 degrees Celsius.

The ensemble is made up of three pieces: jacket, purse and dress. The spontaneous, one-of-a-kind textile designs are the starting point of the design process, and garments were designed with loose-fitting silhouettes. The jacket was pattern drafted by manipulating a kimono sloper into a dolman sleeve. The edging is a piece of dupioni dipped multiple times in the indigo vat for a darker shade and cut on the grain, which adds a certain amount of stiffness and dimensionality to the edge of the garment. The dress is designed in a tubular silhouette with dropped waist, proportioning the body according to the textile designs. The dress was flat patterned using a basic sloper and includes a yoke, lengthened bodice with kissing pleats (front and back), a dropped waistband and gathered flounce. The jacket is entirely silk dupioni and was folded and clamped with 2" x 1" wood scraps in an angular design. A single 2" x 1" linoleum block was carved into a pair of skulls, and clamped at the top of the fabric (appears just left of center front on the upper chest of the jacket). The dress is comprised of a burnt orange salvaged fabric, a flounce of the indigo dyed dupioni, a front batik panel, and a dropped batik waistband. Neckline and armhole are finished with indigo-dyed dupioni bias binding, with 19th century metal buttons at the center back. The central batik panel is comprised of vertical lines of yellow (turmeric), orange (turmeric overdyed with madder), and a saddened navy blue (turmeric and madder overdyed with indigo). The dropped waistband is silk charmeuse, first dyed with turmeric, then covered in batik wax, crackled and then dyed using the indigo vat. The result was a vibrant green, with hints of deeper blues and lighter yellows.

Like your favorite pair of indigo-dyed denim blue jeans that have faded over time, *Resist* is designed to gently fade and become more subdued with wash, wear and exposure to light. The dress and jacket utilize loose-fitting silhouettes to maximize comfort, but also to create large fields for display of one-of-a-kind textile designs created through the resistance of clamped shibori and batik wax. *Resist* is bright and changeable and encourages both designers and consumers to re-think our attachment to stability and embrace the dynamism of color and sustainability of natural dyes.

- Cooney, S. (2011). Four natural dyes from healing plants. *Green Living Ideas*.
<http://greenlivingideas.com/2011/09/01/use-natural-dyes-from-healing-plants/4/>
- Ghoreishian, S. M., Maleknia, L., Mirzapour, H., & Norouzi, M. (2013). *Antibacterial properties and color fastness of silk fabric dyed with turmeric extract*. Heidelberg: The Korean Fiber Society.
- Haar, S., Schrader, E., & Gatewood, B. M. (2013). Comparison of aluminum mordants on the colorfastness of natural dyes on cotton. *Clothing and Textiles Research Journal*, 31(2), 97-108.
- Kenoyer, J. M. (2004). Ancient Textiles of the Indus Valley Region. In *Tana Bana: The woven soul of Pakistan* (e.d., N. Bilgrami). Karachi: Koel Publications, pp. 18-31.
- Siva, R. (2007). Status of natural dyes and dye-yielding plants in india. *Current Science*, 92(7), 916-925.
- Slater, K. (2003). *Environmental impact of textiles: Production, process and protection*. Cambridge: Woodhead Publishing Limited.
- Wendt, I. C. (2009). "Four Centuries of Decline? Understanding the Changing Structure of the South Indian Textile Industry," in G. Riello and T. Roy (Eds.), *How India Clothes the World: The World of South Asian Textiles, 1500 - 1850*. Leiden and Boston: Brill Publishers, 193 - 215.

