

The Art and Science of Natural Dye: Principles, Experiments and Results

Joy Boutrup and Catharine Ellis

FOREWORD BY

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For millennia, humans perceived color through nature and its reflections in human interpretation. Throughout the ages and around the world dyers relied on the colors obtained from plants, fungi, lichen, insects, shellfish, and rock minerals. In ancient cultures such as China and Japan, things that yielded colors were often associated with medicinal and mystical powers. A similar reverence and curiosity about colors derived from nature is growing among contemporary dyers and artists who choose to experience themselves working within the biosphere, in partnership with nature rather than trying to exploit or control it.

Those of us who dye and print with natural materials want to know how to best obtain color and use it to achieve the hues and shades we wish to see—ones that inspire our personal creative expressions. Our desire to use natural colors resonates with current environmental and ecological awareness and a need to know scientifically how to practice natural dyeing sustainably. We want to understand how dyes and mordants work and how different types of fibers react to dyes, mordants, tannins, water, heat, and UV rays. We need to become familiar with the major dye categories such as anthraquinoids, flavonoids, and the three different types of tannins and understand the colors they produce and their properties when applied with particular processes. Having very clear and precise instructions to follow helps us achieve that goal, but unless we understand the WHY behind the HOW we won't be able to make the most intelligent decisions when changing circumstances require that recipes be altered. Organic matters (dyes and fibers) are products of the natural environment and as such are affected by soil, climate, harvesting season, and regionally specific differences, not to mention suppliers, extraction methods, conditions of storage and transport of materials to reach the hands of dyers. Taking such factors into account this book creates a bridge between art and science, showing us the way.

Over the past decade, I have followed a path of inquiry into natural dyes and colors and found my mentor in Michel Garcia, a botanist, horticulturist, phytochemist,

historian, and natural dyer. Catharine Ellis along with many other artists and dyers joined in this mode of research and experimentation with natural materials to achieve colors on cloth or paper.

I first met Catharine in 1990 at the Penland School of Crafts in North Carolina, where she attended a class I was teaching on Japanese textile history. An accomplished weaver, she had practiced that craft since the early 1970s. After spending a week experimenting with placing stitches on cloth and then gathering them to create a resist before dyeing, it was only natural that she would think about applying weaving structure to the resist technique. She was excited to realize that she could use weft floats in weaving like the stitching threads in shibori. Tightening the float she created a puckered surface, which served as a shaped resist for dyeing. When the float was removed, the integrity of the cloth's weave structure was maintained. Woven shibori was the perfect marriage of the weaver's and the dyer's art.

Catharine continued to experiment and discover possibilities. She introduced the idea of combining weaving and shaped-resist dyeing in two editions of *Woven Shibori*, in 2005 and 2016. In the second edition, Catharine covered a broad selection of natural dyes and generously included details of her experimentation with natural dyes and colors on selected natural fibers vis-à-vis work she brought out when she participated in the filming of the instructional video I produced of Michel Garcia's Natural Dye Workshop.

Catharine infuses traditional textile craft with the spirit of scientific experimentation. She loves testing and approaches tedious empirical work with patience and keen observation. She conducts extensive testing for colorfastness and color saturation in different textiles with various processes. She also grows dye plants and creates some of her own dyes. In this age when natural dyeing has become fashionable, she goes beyond simply substituting natural for synthetic dye powder and explores the significance and potential of natural colors in her various weaving projects.

I first met Joy Boutrup in the 1990s and started co-teaching with her in the U.S., Europe and Japan. Teaching with her was like seeing the world of textile design through a different pair of glasses. She demonstrated and taught ways to understand dyes and fibers on a molecular level, to learn about their chemical reactions and bring the most out of the materials and ingredients. For example, Joy's students would never look at woven woolen fabric surfaces the same way as before. She led us to examine each step

of the way that fabric can be transformed, including various ways fleece can be made into yarn, a wide range of weaving structures and fabric finishing processes, and to orchestrate all the variants to create surface patterning and texturing. She has a unique knack for explaining complex textile chemistry, structures and technologies in understandable terms. Her pointers and explanations throughout this book help readers develop a foundation for understanding natural dyeing process and practice. She has provided the backbone of Catharine's search for answers when WHY and HOW came up in her dyeing practice.

Drawing on her training in textile engineering with specialization in chemistry Joy created a stir in Scandinavia by reintroducing industrial formulas from the early years of the Industrial Revolution. Many of her discoveries and re-inventions were welcomed enthusiastically, spread to other countries, and gradually incorporated into the curriculum of textile art education. During the early 1990s she and Jason Pollen, a driving force in the Surface Design Association (SDA), co-taught workshops attended by many leading fiber artists and teachers, including Catharine. Soon there was a surge of interest in North America in adopting industrial processes and understanding the chemical ingredients of the dyeing process.

Joy brings to this book her vast knowledge and her enthusiasm for research into the history of textile technique. She and Catharine offer an essential selection of tested and proven recipes for mordanting, dyeing, and printing that are applicable to all dyers, from beginner to experienced. They present concise, detailed, and objective explanations of WHY specific recipes are selected and used. Readers then can choose HOW to dye with specific materials available to them for a particular purpose. All the recipes utilize environmentally benign and readily available chemicals and substances and are based on the best of historical and contemporary practices. With Catharine, the fiber artist, and Joy, the textile scientist, as your companions and guides, you will enjoy encountering and beginning to unlock the mysteries of natural dyeing.

—Yoshiko Iwamoto Wada, Berkeley, California, January 2018