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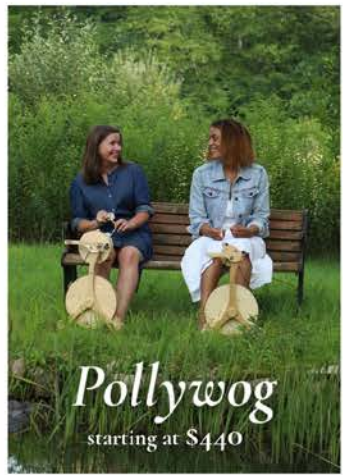


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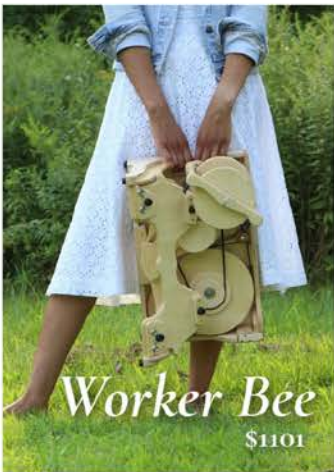
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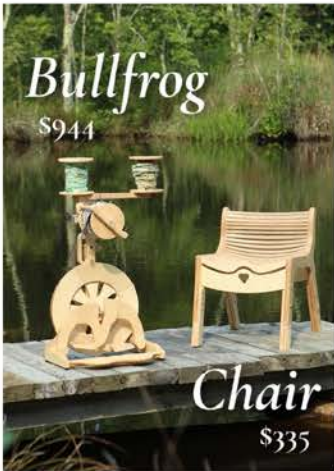
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COLOR QUEST

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Courtesy of Samatoua Textiles

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KERRY BULLOCK-OZKAN

On the cover: Bargello Spindle Bag
by Linda M. Perry (page 80), spindle by
Louet, Merino/yak/silk in "Olivia" by
Kim Dyes Yarn (page 8).

Photo by Matt Graves

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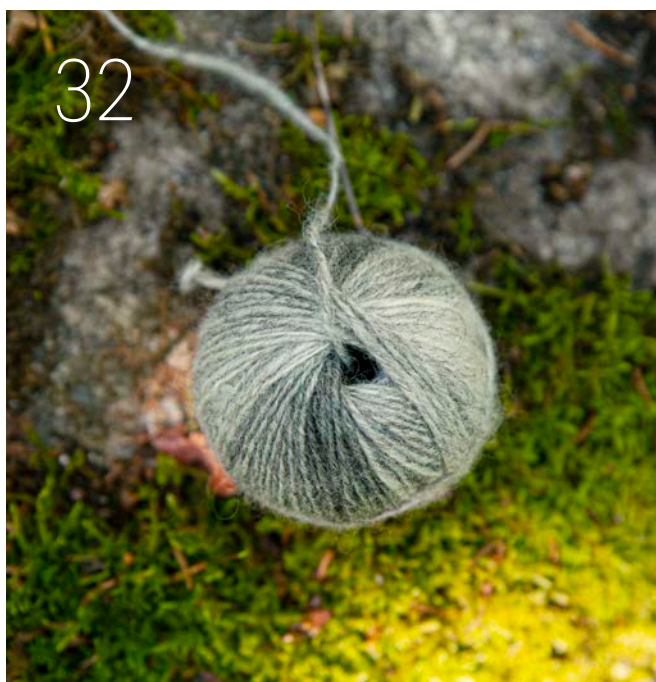


Photo by Dan Waltin



There are few things that excite spinners more than color. Whether your penchant is for ultra-saturated hues, dusty jewel tones, or sheepy shades, much of our work focuses on creating and using color. And not all of those colors come easily. In fact, I'd say that even the most experienced, color-obsessed spinners I know struggle at times with a dye recipe or

how best to use a beautiful handpainted braid. Like any creative journey, it's sometimes this struggle that leads our work off the beaten path and in exciting new directions.

In this issue, we are celebrating the quest for color! Diné shepherd **Nikyle Begay** invites us to learn about natural color in Navajo-Churros—brown, blue, and beyond. **Eileen Hallman** shares her methods for expanding the palette of colors you can get from fresh-leaf indigo, and **John Marshall** puts indigo through its colorfastness paces.

Loads of color explorations don't require a dyepot, and **Kim McKenna** will show you her method of creating smooth slivers in complex colors using a blending board and diz. Swedish spinner **Josefin Waltin** pairs natural sheep colors with knitted tuck stitches to create a fantastic shawl known as a heartwarmer or bosom friend. And **Linda M. Perry** shares her passion for bargello needlework and a stitched tote project for your go-to travel spindle; we hope you are as inspired by her work as we are!

The best way to learn more about color is to use it. Join us as we hunt for hues this spring!

Wishing you peace and perfectly filled bobbins,



Kim McKenna created two different colorways for her Ancient Earth Shawl. Find the pattern on page 52.

Photo by Matt Graves

Spin Off®

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Bargello Needlepoint:

A Pattern Directory for Dramatic Creations

Laura Angell and Lynsey Angell

"Wow!" My exclamation reverberates across the living room, startling my husband and two cats.

It's a quiet Monday night. Work is done. The toddler is asleep. *Bargello Needlepoint: A Pattern Directory for Dramatic Creations* is propped open on the couch, turned to one of the beginner designs: flame. I've done the first few rows in bright reds and oranges on a blank bookmark I picked up from the craft store.

Bargello Needlepoint is an ode to a centuries-old needle craft that uses color fades and relatively simple stitches to create eye-popping patterns. After reading the brief introduction and materials description, I was off to the races, looking over the stitches before jumping into my first design. If I approached craft in a more measured way, I would probably have done a sampler with the different stitches to get the hang of the counts and the general feel of each one, but what's the fun in that? The bookmark would be my sam-

pler. If I messed up, I would just tuck the thing in the most boring novel on my shelf.

The flame pattern came together quickly, building into glorious shapes using vertical stitches. Feeling confident, for my next segment on the bookmark, I went with a leaf pattern from the advanced section of the book. The leaf itself isn't difficult to make—just diagonals at various angles—but I really had to focus. Even one square off in my 14-count fabric threw the whole leaf off, and I will readily admit that I unpicked dozens of stitches. Slightly cowed, I retreated to an intermediate pattern called Boxed Hungarian Point, loving the look so much I continued to the very bottom of the bookmark.

Through all three stitch variations, I appreciated that the authors used a variety of techniques to show off each pattern, including a chart, photographs of the steps toward the finished pattern, and a written description; I used them all to become



more comfortable with each design. Moreover, their choice of colors and the variations shown helped me gauge which of my own thread hues would work best.

The authors state in the introduction that "bargello embroidery is suitable for both decorative panels and larger wall hangings, a number of domestic items such as cushions and chair seats, and accessories such as bags and belts." My bookmark sampler in hand, I definitely plan to return to this pattern book over and over to bring bargello motifs to a variety of projects.

—Erika Zambello

Mineola, NY: Dover Publications, 2020.
Paperback, 160 pages, \$22.95. ISBN
9780486842912.



Erika stitched her sampler on a blank bookmark ground, so placing it in a hoop helped with tension.



A first bargello sampler stitched with commercial embroidery yarns paves the way for handspun explorations!

Photos courtesy of Erika Zambello

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One of the joys of spinning is the portability. Grab some fiber and a spindle and away you go. A wrist distaff can help keep that fiber wrangled as you stroll through the park, along the beach, or booth to booth at a fiber event. A slide bead on the soft leather wristband allows you to adjust the fit to keep your fiber within reach. Shown in dyed apple wood. yarnspindles.etsy.com




If you are looking for a way to store your handspun on smaller bobbins or get it ready for weaving, Sistermaide's Winder Stick can help. This beautifully handmade tool fits into a standard drill the same way a bit does.

The tapered end can accommodate either Leclerc or Schacht plastic bobbins. sistermaide.etsy.com



Getting started with natural dyes is easy with this all-inclusive kit from The Love of Colour. The mordants, easy-to-follow instructions, and dyestuffs—cochineal, madder, logwood, and osage—will produce a beautiful sunset of color on either cellulose or animal fibers. theloveofcolour.com



Merino, yak, and silk come together in this luscious airy blend. Gently dyed, the fiber has short runs of mixed but unmuddied colors along with a few well-placed undyed portions that add to the character of this braid. The Into the Wishing Well colorway from Kim Dyes Yarn will have you throwing your coins for good luck! kimdyesyarn.com

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Marie Kee is from the Towering House and Coyote Pass clans. Seen here outside her home on the Navajo Reservation, she holds up one of the beautiful churro rugs she has woven. Marie has been weaving since she was a child and she creates her rugs with wool from her sister's sheep.



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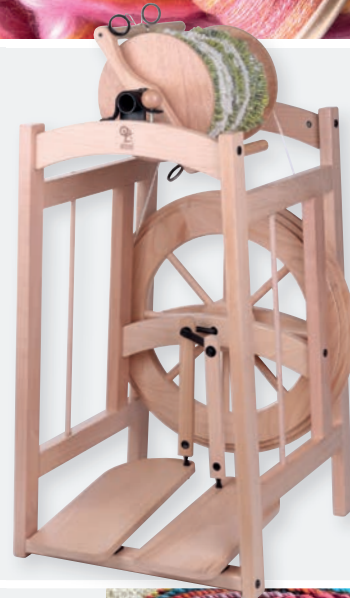


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Ann models her swirling sweater at Point Lobos.

Photo by Rick Pettit

Handspun Swirl Sweater

ANN PETTIT

Designer and pattern Sandra McIver, Plum Perfect from her book, *Knit, Swirl!*

Fiber I created three yarns for this project. The first yarn is a natural brown Merino purchased at the Monterey County Wool Show. The first carding was with the wool only. I added turquoise silk noil and green mohair locks purchased from Eugene Textile Center on a second carding. The second yarn is the same natural brown Merino carded once by itself. The third

yarn is a commercially prepared mystery wool that I dyed with leftover dyes at the end of a guild dye day.

Wheel system Majacraft Little Gem 21:1 for the singles; Ashford e-Spinner for plying.

Drafting method Woolen, long draw, occasionally pinching the twist near the orifice but most of the time not actually double-drafting.

Singles direction Z-spun.

Ply wraps per inch 3-ply, 12 wpi (Yarn 1); 2-ply, 14 wpi (Yarn 2); 2-ply, 14 wpi (Yarn 3).

Total yardage 980 yards (Yarn 1), 655 yards (Yarn 2), 970 yards (Yarn 3).

Yarn classification/weight DK to worsted.

Needles Size 8 (5 mm).

Gauge 18 sts and 26 rows = 4".

Finished size Center back measures 30".

This sweater began in 1994 when I fell in love with a soft, smelly, lustrous, dark fleece under the oak trees on the last day of the Monterey County Fair Wool Show. It was a triumph to angle my way into the bidding fray and succeed in purchasing it at the auction. This beauty was from a natural-colored Merino

sheep named Cat, raised by Janet Heppler in Covelo, California.

I waited many years to realize that my congesting mountains of beloved fleece had accumulated behind the roadblock of processing. I really did “need” or deserve or warrant that splendid drumcarder so long



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in my slaving sights. After purchasing it, my spinning life was full of lovely springy piles of delicious wool batts!

I finally found the perfect project for Cat's fleece while traveling with three of my fiber friends. I saw a sweater from the book *Knit, Swirl!* on display at Island Wools, an LYS in Friday Harbor, Washington. The sweater swings around wonderfully when you twirl!

I created three yarns for my sweater, which I call Chocolate Mint (my favorite ice cream). For Yarn 1, I processed Cat's fleece by first washing 1-ounce lots in hot water (at least 160°F) and Dawn dish soap. Then I picked by hand and drumcarded it on my Strauch Finest. I carded a second time, adding a sprinkling of turquoise silk noil and a light dusting of teased mohair locks in multiple shades of green. The fiber was a pleasure to handle from start to finish.

For Yarn 2, I carded fleece from Cat without any add-ins. For Yarn 3, I used commercially prepared fine white wool roving from the stash of a retired spinner. I dyed it at the Carmel Crafts Guild summer dye day surrounded by fiber friends. I like serendipity, so I used my mystery roving to soak up dyes left over at the end of the day.

While I spun the yarn, self-doubts came to the surface: The colors are wrong. The yellow is too strong and doesn't go well with the green flecks. I should have been more intentional when I was dyeing that roving. Why am I so "seat of the pants"? If I am going to spend all this time dyeing and spinning and knitting, why do I use up others' unused dyes? But the big colorful cakes of yarn are enough. And the stack of chocolate brown cakes of yarn are enough.

More questions crossed my mind as I knitted: How long are the sleeves? How long are my arms? Was that row 4 or row 5? I forgot that decrease! I reminded myself that things must be stitched together to be useful. My seams are not beautiful; I do not enjoy them. But I reminded myself again that things must be stitched together to be useful. Finally, I had my own sweater that swings and swirls.

The oak trees and the auctioneer, Sarah's backyard full of dyepots and Allison's laugh, the living sheep and the living grass all embrace me in my new sweater. ●

Have a finished object to share? Tell us about it! Contact spinoff@longthreadmedia.com to submit your project.



Natural-color Merino



Dyed mystery roving



Merino wool carded with silk noil

Photos by Ann Pettit

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Lotus blossoms cover Tonlé Sap Lake near Siem Reap, Cambodia.

The Wonder of Lotus Fiber

Wisdom • Purity • Peace • Spirituality

LINDA LIGON

*The virtues ascribed to the lotus plant (*Nelumbo nucifera*) in Asian history and lore are boundless. Every part of the plant has utility and virtue, whether medicinal, nutritional, spiritual, or all three. And it is beautiful, with pure, stately blossoms rising above large circular leaves, whole vast lakes of them. The flowers are harvested daily for religious and decorative uses. But overlooked for centuries, at least in the Western world, is the cloth woven from its fibers.*

Besides all the aforementioned virtues, fabric woven from lotus fiber is wrinkle resistant, water-resistant, breathable, sturdy but sinuous, and comfortable in every way. It's said that in villages across India, Myanmar, Cambodia, and Thailand, the fiber has been harvested and crafted into special ritual cloth since ancient times.

And perhaps that's true. The practice had a "revival" in the early 1900s, a brief time when workshops in Japan

and India began harvesting and processing and making this work known. It's extremely labor intensive, though, as you'll see, and these efforts languished until recently.

FROM STEM TO CLOTH

We'll focus on Lake Kamping Poy near Battambat, Cambodia, where Samatoa Textiles has established a workshop to revive the craft. Around 15 hectares (37 acres) in area, the lake's surface is a vast field of lotus plants. Harvesters go out four times a day in narrow wooden boats to harvest the blossoms and slice off the stems for fiber. It takes 1 hectare, or 30 kilograms of stems, to supply a single spinner, who can produce 250 meters of thread per day.

"Spinning" isn't really an accurate description of how the thread is produced, though. Each stem is sliced through, and its 20 to 30 fine filaments are drawn out and hung to dry. They are then rolled by hand on a flat surface, with new fibers spliced in to create a long thread, suitable for warp or weft.

Twenty-five thread makers are required to supply yarn for a single weaver. The fabric is woven on a

Grow your own

Lotus fiber for spinning isn't available from any commercial source, but you can grow your own. A backyard koi pond or other body of fresh water is ideal, but even a large pot on a sunny windowsill can work. The care and feeding of lotus plants is the same as for water lilies. Seeds and rhizomes and growing advice are available from many sites on the internet.

traditional Cambodian loom, 24 inches wide with two counterbalanced shafts and foot pedals. A typical warp is 100 yards long and takes about a month and a half to weave. A yard or so of fabric is estimated to require 32,000 lotus stems. You can see why the fabric is considered rare and precious.

THE CLOTH ITSELF

Lotus fabric has been described as resembling a combination of silk and linen. In fact, it has a feel that's different from either. It is cool to the touch yet highly insulative, with a sleek hand and light weight that are at odds with its slightly rustic appearance. The individual



Photos courtesy of Samatoa Textiles

In a day's work, a single spinner can twist 250 meters of thread from 30 kilograms of stems.



Twenty-five thread makers are required to supply yarn for a single weaver.

fibers are similar in size to industrial microfibers, but instead of being solid extrusions, their structure is helical: a twisting flat ribbon of ladder-like spaces and cross-connectors (discernable only with the help of a scanning electron microscope). Its flat, twisting shape is similar to that of cotton.

The scarf below is woven in plain weave at about 30 warp ends per inch. Where the threads hang loose in the fringe, they have tended to bloom and soften and feel like fine cashmere. They ignite readily but self-extinguish. This scarf's color is natural, but lotus fiber takes well to vegetal dyes, which have been used traditionally, and to some chemical dyes.

The Lotus Sutra, whose symbol is the lotus blossom, is an ancient document incorporating the final teachings of the Buddha. The sutra is considered, according to Western translators, "complete and sufficient for salvation." Like this sacred document, the lotus plant itself is complete and sufficient. Consider its

nourishing rhizomes that thrive in the mud of shallow lakes; the stem that provides precious fibers; the pads and seeds, for which extravagant medicinal and nutritional claims are made; and the pristine and stately flowers, which have spiritual force across the globe. Use of its fiber for woven cloth is just one of the plant's many virtues. ●

This article was previously published in The Long Thread, edited by Linda Ligon.

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Samatoa Lotus Textiles has a robust website with information and products for sale. samatoa.lotus-flower-fabric.com.



A scarf woven of pure, undyed lotus fiber feels both earthy and silky, both warm and cool.

Photo by Matt Graves



Left: Up to 50 filaments can be drawn from each lotus stem. Above: Lotus fiber blends well with other natural fibers and takes natural dyes beautifully.

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Photos by Matt Graves unless otherwise noted

Dye materials shown (clockwise from top): ground madder, black walnuts, alum, marigolds. Martha knitted a shawl using handspun leftovers and then piece-dyed it in madder and lichen.

Piece Dyeing

It's never over!

MARTHA OWEN

This story starts like an old one, a story of handspun garment design and rejuvenation that begins, “Joseph had a little overcoat. It was old and worn. So, he made a jacket out of it and went to the fair.” Through the story, Joseph’s jacket is remade again and again. He should have tried dyeing!

Piece dyeing is a way to refresh a garment, unify a textile created with many odd bits of yarn, or alter a palette of many shades in a previous over-dye experiment. It is also a way to recover from an “oops!” color combination.

Samples are a nice thing in a well-planned life, but, of course, sampling doesn’t always happen. There is an enthusiasm that moves us from the wheel to the loom or needles! Piece dyeing offers us a way forward that does not involve starting over; it can create a fresh look by adding a unifying color to the entire textile. Close your eyes and imagine dyeing a multicolored sweater: What will happen if I put the whole thing in a blue dye pot? What about yellow or walnut brown? Will the colors mix or layer?

CREATING A SET OF SWATCHES

I searched my baskets of handspun yarns with “no known destiny” and chose bottom-of-the-barrel



A basketful of Martha's handspun gleanings

Photo by Martha Owen

combinations that were not so satisfying at the start. I chose those that were about the same gauge. These were forgotten odd bits of handspun, gifts of departed spinners, and leftovers from long-ago projects. I started with colors of yarn that did not represent the thing I planned to make and wear. Like pieces from a potter who paints glaze designs that look very different when fresh from a hot kiln, my shawl—while on the needles—was shades and speckles of this and that.

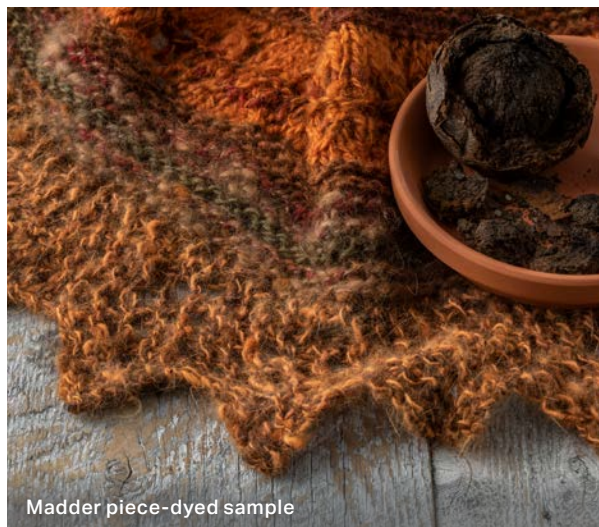


Jars of steeping dye. Martha gathered the late summer/early fall lichens and walnuts from the grounds of the John C. Campbell Folk School in North Carolina. The weld and marigolds were harvested at the Cory Brown Memorial Dye Garden located at the Folk School.

Photo by Martha Owen

I have done enough messing around and natural dyeing to know what to expect—kind of! As a starting place, I look at notes and books and follow recipe guides for pure-color pots. Most of the time, a perfectly delicious colorful textile results from my efforts. So then I go swinging down the road singing! The only true promise from garden and nature dyeing is this: Sometimes odd and curious effects occur.

For the color-test samples, I made one big, long swatch instead of six small swatches. Effects occur in a long row of knitting that do not happen in small, short rows. The colors are stretched out and more blended at the start. My big idea was to combine my odd balls in a sample shawl, mark and sew sections, and then cut the shawl into pieces. I ended up with six swatches (almost the same size). This test would allow me to see the same textile with six different natural dye methods.



Madder piece-dyed sample

Note: It is profoundly difficult to cut a straight line that marches across openwork and garter-stitch areas. I followed the advice of Elizabeth Zimmermann from long ago and ran a guide thread down the edge of each section. I went to the sewing machine and sewed two parallel lines of stitching on each side of my



Martha modeling the second shawl before dyeing. The circular shape was inspired by traditional Faroese shawls. In this photo, Martha is wearing a piece-dyed sweater that started off black and white and then made a trip into an indigo vat.

Photo by David Liden



Into the Dyepots

1 Natural: Sample before piece dyeing.

2 Walnut: I have always heard that walnuts don't need to have a mordant, but I reread a few lines from Rita Buchanan in which she mentions that she gets a wider range of colors if there is mordant. I soaked about a gallon of walnuts, simmered them for a while, and then added alum at 8% weight of goods (WOG). Walnuts have a unique aroma!

3 Weld plus marigolds: I wanted to dye two swatches and a small skein of yarn totaling about 4 ounces (110 grams) of fiber (WOG). I weighed out about 8 ounces (250 grams) of plant material and calculated 8% alum and 7% cream of tartar based on the WOG. All of this went into the dyepot with my fiber for about an hour.

4 Weld and marigold with iron: One of the weld and marigold swatches went into an iron afterbath (no more than 2% WOG for iron). I call this the mood shifter because some say iron saddens.

5 Madder: In my box of dyestuffs, I found about 1 ounce of madder root grown by my dye mentor, Jim Liles from Knoxville, Tennessee. I soaked and roughly chopped the roots, added water, simmered, and decanted the colorful liquid until I had enough liquid to float my fiber. One swatch and the second shawl shown on the previous page weighed 180 grams. I added alum at 8% WOG.

6 Lichen: Over the last months, I found the lichens on the ground after big rains in Brasstown, North Carolina. The rain simply peels the lichens off for me, and I stuff them in my pockets until I have a nice pile. Using the boiling water method, I made a cheesecloth bag full of lichens, estimating 200% WOG for the fibers being added. Lichens continue to give color and require no mordant, so I kept dropping things in the pot. I couldn't stop myself! The textiles keep a lovely nutty smell for many years.

guides and then carefully sliced them apart with scissors. Zimmermann says to then take two aspirin and lie down for 10 minutes, or maybe 15!

While doing all this, I pondered about mordant. Did I need to premordant these swatches? Since the yarns I used were mostly of natural sheep, alpaca, and Angora rabbit shades, I decided instead to put the mordant in with the dye as I prepared each pot. Many regions and cultures add the mordant right to the dyepot. I generally don't, but in the interest of speed, I proceeded! I used the mordant calculations I found in *Wild Colour* by Jenny Dean based on percentage of mordant to the WOG.

THEORY INTO PRACTICE

After seeing the results of my samples, I decided to knit my true shawl, matching the first as closely as I could. Then I dyed it first in a madder bath but then cooked it awhile in a lichen pot. I checked the color while the shawl was in the dyepot and took it out when I thought it was just right. After rinsing the shawl, I pinned out the points, which opened the garter-stitch areas to look like netting.

In the spirit of "it's never over," we can certainly dream up ideas where we full and shrink, cut and sew, raise the nap and put it on. This brings us back to that old story where Joseph showed us that you can always make something out of nothing. ●

my piece-dyed shawl, created with odd bits of leftovers, was finally dry, I gave the surface a stiff brushing to raise the nap and put it on. This brings us back to that old story where Joseph showed us that you can always make something out of nothing. ●

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Martha Owen is a resident artist in spinning, knitting, feltmaking, dyeing, and surface design at the John C. Campbell Folk School (folkschool.org) in Brasstown, North Carolina. Her adventure in spinning and natural dyeing began at this very school in 1978. Since 1980, her extended family has included sheep, Angora rabbits, Great Pyrenees, and border collies. Also a banjo player and known to tell a story or two, Martha's interests in sheep, wool, music, and dance have carried her literally and joyfully around the world. Her children say she is a wool nerd, but her sheep say she is outstanding in her field! Find her on social media @marthaowenwoolens.



Samples after sewing and cutting



Madder piece-dyed sample



Weld and marigold piece-dyed sample



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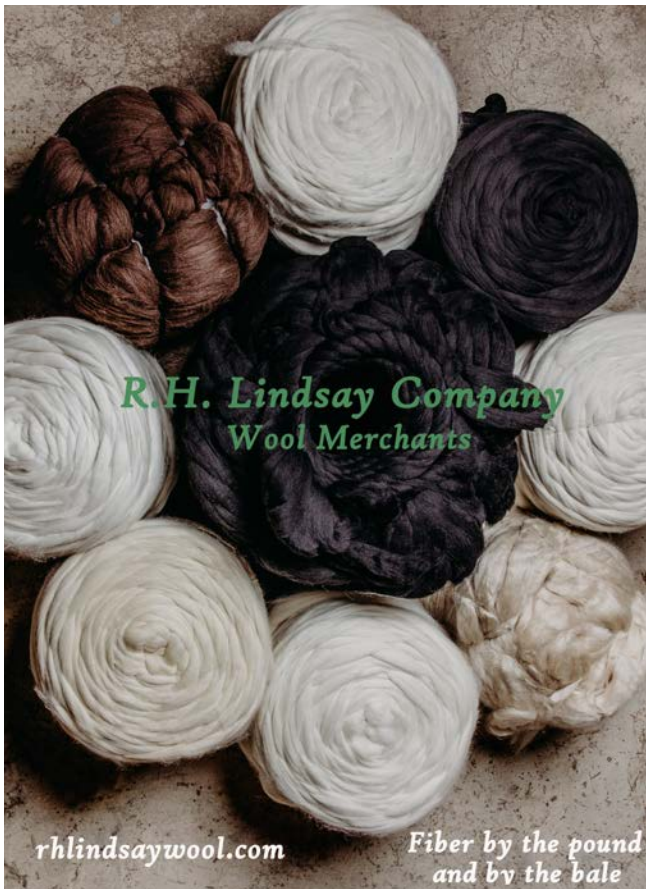
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Photos by Nikyle Begay

Blue Sheep (*dibé doottizh*)

A Shepherd's Search for Natural Color

NIKYLE BEGAY

Growing up, I was the type of child who would always stop to smell the roses. Taking in as much as I could and just appreciating the world as it was. Who knew that one day, while stopping to take it all in, I would find myself in the midst of renowned Diné shepherds and weavers and it would change my life forever?

Fourteen-year-old me drew in a big breath as I wiped the sweat off my forehead. It wasn't roses I

could smell on this particular hot day in June—it was sheep poop with a hint of dust and juniper. I had just finished setting up a makeshift corral and was about to unload my sheep from the trailer. I was at the annual Sheep Is Life Celebration in Tsaile, Arizona, a unique event hosted by Diné be' iiná (Navajo Lifeway, Inc.) that celebrates the Diné pastoral and weaving lifeways. More specifically, I was there for the exclusive Navajo-Churro sheep and wool show. I was excited to see more rigs pulling trailers full of sheep

A blue ewe in Nikyle Begay's flock of Navajo-Churro sheep

beginning to show up, and other attendees were setting up camp for the weekend.

It was when I took out my loom, which was fully warped with half of a project woven, that Ron Garnanez approached me. Ron is a respected Diné elder who tends his ancestral flock of Navajo-Churro, migrating with them seasonally. He has been spinning, weaving, and teaching for decades. At the time, he was president of Diné be' iiná. He peeked into my trailer and commented on the colored sheep inside. He then turned toward my loom, inspecting it and looking closely at the pattern that was emerging within the warp.

“We [Diné] weavers, we weave for rain,” he said. “Everything we do, from carrying the flock through winter, to shearing them in the spring, to carding and spinning the wool. It’s all woven in the hopes that it brings rain.”

You see, in our culture it is said that the first loom and warp were created using elements from a rainstorm. The bottom crosspiece was made from earth; the top crosspiece was made from the sky. The two upright beams were made from sunlight. The top tension beam was made of clouds. The tensioning rope was made of lightning. The two dowels that are bound to the warp were made of rainbows.

But it’s the warp that Ron wanted to talk about. Traditionally, the warp is spun from a fleece that is harvested from a sheep we call *dibé dootlizh*, or the blue sheep. These sheep are born jet black, but by four months of age, their wool begins to fade into a silvery blue color. He continues his story: “When your project is warped and it is tensioned onto the loom for weaving, it’s the warp that represents rainfall. The two sheds represent what we call male and female rain.”

Male rain is torrential rainfall that digs gullies and that has spectacular shows of lightning and thunder. Female rain is a softer and gentler type of rainfall, one that soaks into the ground.

“When the warp is up on the loom, take a step back,” he said. “You see those warp strings? When you spin it from a blue fleece, the color makes it look like a blue rainstorm because the first blue sheep were crafted by the deities using rainclouds.” He then began to chuckle and said, “Talking about the blue sheep

In our culture it is said that the first loom and warp were created using elements from a rainstorm.

reminds me of the time I caught my elderly grandmother chasing her ram around the corral.” He grinned from ear to ear and continued. “She had the end of the lariat in one hand and a badger pelt in the other. The loop was lassoed around the ram’s horns, and when she had the chance, she’d whack him with that badger pelt.”

I looked at him in amazement and disbelief. I wanted to hear more because this seemed too wild to be true! I worked up the courage and asked him, “Why *was* your grandmother swinging that pelt at her ram?”

His eyes began to well with tears. “My grandmother was a spiritual woman,” he said. “She believed that blessing the ram with a badger pelt, before releasing him into the flock, would encourage the production of more colored lambs. She believed the lambs that were born in the spring would be multicolored like a badger. She always hoped to get at least one lamb that would grow into a blue sheep.”

This was a traditional belief that Ron’s grandmother held dear, so much so that even in her elder years, she tried to carry on the tradition all on her own. I thought about the many shepherds and weavers before me and how they appreciated every color of wool. I mean, to chase a 200-pound ram around a corral, while smacking it with a badger pelt is a profound way of asking the universe and this ram for the colors you’d need to warp and weave a beautiful rug.

I held my eyes shut. I could smell the monsoon rain and wet dirt far off in the distance. I drew in another whiff, this time full of curiosity. I just needed my own badger pelt and a ram to whack with it! Jokes aside, I truly wanted to understand how color and its inheritance worked within our breed of sheep. Like the age-old question, What came first, the chicken or the egg? Is a spotted sheep white with black spots, or is it black with white spots? After talking to Ron, I needed to answer this.

When I opened my eyes, I could see that the other campers had settled in, and their sheep were unloaded



A brown ewe is a gift from the rainbow beings.

into their own pens. Those sheep were unfazed, crunching on hay and chewing their cud; little did they know they'd be competing for prize ribbons the next day. While the showman in me was analyzing what my little flock was up against, I couldn't help but notice that most of the sheep there were solid white, and mine were either solid black or brown. Did I miss the memo? Should I have brought the few white sheep I had left behind at home? No! I was just psyching myself out. What I needed to do was finish setting up and prepare the sheep for the shows the next day.

BROWN SHEEP

The next day came and I found myself showing against a wonderfully diverse colored class of beautiful Navajo-Churro ewe lambs. The judges approached me and my brown ewe lamb Copper. She got her name from her long, silky, reddish-brown fleece. Founder of the Navajo Sheep Project, Dr. Lyle McNeal, who was one of the judges, told the tale of how in the olden days, he'd only ever seen brown sheep in Two Grey Hills, New Mexico, where the famed Two Grey Hills tapestries were woven with nothing but natural colors. He brought in Connie Taylor, who was a longtime breeder of Navajo-Churro

sheep and the breed association's registrar; she talked about the significance of colored sheep and how their wool was used by Hispanic and Diné weavers. She used unfamiliar terms such as *loci*, *agouti*, and *extension* to explain how a sheep inherits and exhibits color. I was mesmerized! I just had to learn more!

Later that evening, I caught up with Connie. We spoke about colored sheep. She explained the different colors and color patterns that I had in my little exhibition flock. She pointed me in the direction of various books, noteworthy people, and most importantly, another breeder who exclusively studies color and color pattern inheritance within the Navajo-Churro breed, Ingrid Painter.

I returned home from the Sheep Is Life Celebration full of new and exciting knowledge. As I unloaded the sheep into their home corral, I looked at them with new eyes. Who would have known that my curiosity would turn into a lifelong study?

Before reaching out to Ingrid, I spoke to Diné shepherds to learn as much as I could about their experiences with colored sheep. "To get brown, you must have already had brown in the flock," said one elder. "But don't get too greedy! We [Diné] are not supposed

“The Rainbow Beings are who created the first brown sheep. They created the most coveted colored sheep of all. The Rainbow Beings put a little bit of their beauty into the first brown sheep. This was to test our humility. If the Rainbow Beings were pleased with us, they would bless us with brown sheep every so often.”

—Nikyle’s Grandfather

to have too many brown sheep. They are a blessing, so treat them as such!”

I asked my grandfather, a Diné medicine man who holds a wealth of traditional knowledge, about the correlation between greed and the brown sheep. “The Rainbow Beings are who created the first brown sheep,” he responded. “They created the most coveted colored sheep of all.” He reminded me about the traditional story of the creation of sheep and how at one point, we Diné had sheep, but we became too greedy, and they were taken from us. “The Rainbow Beings put a little bit of their beauty into the first brown sheep,” he explained. “This was to test our humility. If the Rainbow Beings were pleased with us, they would bless us with brown sheep every so often.”

After listening to my grandfather tell the traditional tale of the creation of sheep, I became eager to connect with like-minded shepherds—those who’ve dedicated their lives and flocks to studying just this. I wanted to learn how science explains the color possibilities within different breeds of sheep and how I could apply the science to my own flock so that one day, I could have a “blue sheep” of my own.

Since then, I’ve made new friends from all over the world—friends that I’ve gained a wealth of knowledge from. I learned that loci are locations on a strand of

DNA controlling color, color pattern, and spotting displays. Agouti is a gene that controls the variations of “wild” color patterns. And extension refers to another gene that, if lined up correctly, can inhibit a sheep’s ability to display color patterns.

At first, I didn’t exactly home in on creating a blue sheep; instead, I was focusing more on colors of wool as my spinning and weaving skills progressed. But I also focused on the quality of my wool. I found out over the years that sheep are either black or brown at the molecular level, and patterns are variations of symmetrical white or tan markings on their bodies—sometimes lambs are patterned like badgers!

MAE AND THE WHITE-BELLY SHEEP

I noticed that, when switching rams annually, some over-the-top, “wild” agouti-patterned lambs began to spring up in my flock. Their color patterns were reminiscent of their wild bighorn cousins. This reminds



A gray (white-bellied) ewe—cousin of the bighorns



Blue Navajo-Churro fleece used in a handwoven textile

Photo courtesy of Kelli Dunaj

me of a story told to me by an elder. She has since departed, so out of respect for her living family, I'll call her Mae.

Mae came to my home one evening. She had noticed the wave of colored sheep grazing along the highway fence and asked if I had any colored wool available. I showed her what I had in my "wool stash," and she was quite pleased as she carried three bags of gray fleece to her truck. I asked if she wanted to see the sheep who grew the wool, and her face lit up as she nodded her head yes.

As we walked to the corral, she talked about going to the old trading post around the bend from my place. It was where she and her grandparents would trek each time her grandmother finished weaving a rug. The old Sunrise Trading Post was where local weavers took their rugs to either trade them for the goods they needed at home or sell them for cash. It was a place that my great-grandmother often sold or traded her rugs as well.

When we made it to the flock, I pointed out a ewe and her two daughters. "Those are the sheep that you have the wool from." She interrupted me as I described the sheep's color pattern. "I know those sheep have white bellies," she said. I nodded my head and she continued. "My grandmother wove large Klagetoh rugs, with gray backgrounds and a red diamond in

"Those white-belly sheep saved me from being taken away. My grandmother called them 'cousins of the bighorn sheep,' and she was right. They were wild like bighorns."

—Mae

the center." She got emotional, wiping away tears and said, "Those white-belly sheep saved me from being taken away. My grandmother called them 'cousins of the bighorn sheep,' and she was right. They were wild like bighorns."

Mae grew up in a time when Indigenous children were often taken from their families at a young age and then shipped hundreds of miles away to a residential school. When the children arrived at those schools, they were stripped of their indigeneity. Their hair was cut off, and they had to get used to a new wardrobe. They were punished if they spoke their native language, and sadly, some children never returned home. Many untold horrors of the lives that were cut short are now being uncovered in unmarked graves at residential schools in North America.

She said that one morning, when she was a young child, her grandfather burst into the home where she and her brother slept. He woke them and hurried them about the house, collecting their clothes, shoes, and a bag full of bread and jerky. As they scurried out of the house, making their way to the sheep corral, Mae turned back to look at the house and noticed her grandmother using a juniper branch to sweep their footprints away. She looked at her grandmother in confusion, crying and wondering why she would erase their existence. When they got to the corral, their grandparents told them to head for the mesas in the distance and that they would send the flock of sheep after them to hide their tracks.

“Follow the cousins of the bighorn sheep,” Mae’s grandmother told her. “They will lead you to freshwater springs and hide you from danger. They know the land like their cousins do. They will keep you safe. Now go!” She remembers making it to the far-off mesas and hiding in the brush with her brother, watching the sheep make their way toward them. When the sheep made it, it was the sheep with the wild color patterns that had the inclination to move onward and take them up the steep mesa’s edge. She remembers being on top of the mesa for three days and following those special sheep around to the freshwater springs and to safe places to sleep at night. On the fourth day, she heard her grandfather’s voice echoing in a nearby canyon. They peeked over the ledge and saw him on horseback, calling out for them to return home.

Mae recalled how happy she was to return home, how happy she was to see her grandmother, and how happy the sheep looked to be in their corral. She never asked why they had to spend those days up in the mesas, but as she got older, she would make friends and meet her husband, who all were taken away and sent to residential schools.

Mae made her journey a couple of years after our meeting, so I was never able to follow up on how she liked the wool. Her grandmother describing those patterned ewes as cousins of the bighorn sheep and Mae’s use of natural colors in her weaving fueled my passion to continue my journey to produce consistent colored wool.

BLUE SHEEP

In 2019, it had been 16 years since my first meeting with Ron Garnanez and the beginning of my adventure with colored sheep. This also meant 16 seasons of breeding sheep and lambing. But as the lambs began to display more exciting color patterns, their wool was becoming coarser. How could I control the quality while trying to maintain all my studies? Perhaps introduce a solid-colored or completely white ram? Well, I couldn’t bring myself to use either, so instead, I found a subtle-looking, ultra-recessive color-patterned ram.

This ram, whom I named Ucolo, came to our flock from Spring Coyote Ranch in Marshall, California. He, at the time, was everything I was looking for. Tall, handsome, and most importantly, had a soft, drapery brown fleece. At the end of July in 2020, I introduced him to the ewes. Five months later came the winter snow and newborn lambs. I was ecstatic! All but two of his lambs were born brown, and each had fun color-pattern expressions. I felt proud to watch the lambs develop into their own personalities, to see how their wool quality was like night and day compared to the quality I was getting before. It wasn’t until they were four months of age, frolicking around the range as their mothers grazed, that I noticed that one of the two black lambs was fading to a silvery blue color, just like the *dibé dootłizh* (blue sheep) does!

Experimenting with colored sheep and wool quality all those years, I had inadvertently bred a color that I set out so long ago to breed. My research and the use of my flock’s wool in my weaving continues today. I still find myself stopping to smell life’s roses. Whether it’s sheep poop or the wet dirt after a rainstorm that I smell, I hold closer the appreciation for the many stories of my elders, ancestors, and their (now our) journey with colored sheep. ●

Nikyle Begay (they/them) is a Diné shepherd, fiber artist, and teacher based in Ganado, Arizona, on the Navajo Nation. Nikyle is the Director of Rainbow Fiber Co-Op and brings a wealth of knowledge and expertise to the project. Nikyle has experience working in technology and the nonprofit sector, as well as an extensive background in sheep flock management, wool production, traditional wool processing, and the weaving arts. You can find them on Instagram @navajoshepherd.



Cecilia's Bosom Friend is a reversible shawl that wraps around the torso.

Cecilia's Bosom Friend

JOSEFIN WALTIN

I have a bosom friend who is also my second cousin. Her name is Cecilia. A few years ago, we reconnected after nearly 40 years and have had daily contact ever since. Cecilia is also a spinner, and we see each other at wool events. At one such event, she was wearing a bosom friend, known in Swedish as *hjärtevärmare*, which translates to English as “heart-warmer.” I hadn’t thought much about this kind of shawl, but when she wore it, I instantly fell for it and wanted to design one. There is something comforting with a shawl securely wrapped around the bosom. It makes me feel safe and, at the same time, free to move.

As I worked out this pattern, I knitted a bosom friend for Cecilia in white and brown variegated yarn. Then I knitted the version shown here for myself in white and variegated gray yarn. The variegated grays almost appear as if I’ve used a palette of separate grays because of the stripe pattern in tuck stitches. Natural sheep colors are endlessly inspiring!

The tuck-stitch pattern I’ve used here has a “right side” and a “wrong side” for pattern-reading clarity, but I think of it as fully reversible. Both sides are equally

beautiful. When I wear a shawl, I don’t want to have to bother looking for the right side—I just wrap it around me and go. Or I can choose the side that fits my mood that day.

TUCK STITCHES AND SINGLES YARNS

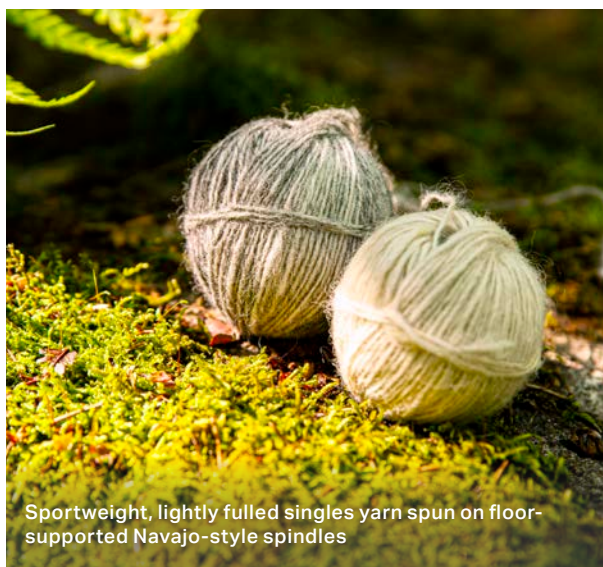
A year ago, I came across Nancy Marchant’s book *Tuck Stitches: Sophistication in Handknitting* and was fascinated by the waffle-like structure and compact squishy-spongy feeling of the tuck stitches. All the samples in the book were knitted in two fingering-weight yarns in contrasting colors that made the stitches pop. Inspired, I decided to incorporate tuck stitches into the design for my bosom friend using singles yarns. As a handspinner, I have the freedom to work with a variety of colors in a fleece, so I wanted to highlight the natural shades in the dark yarn.

Singles yarns can give an airy fabric structure but aren’t without challenges. To avoid bias in my shawl, I decided to spin the dark and the light yarns in different directions. To be on the safe side, I also decided to full my yarns. The tuck-stitch pattern I chose behaves like a broken rib pattern that will prevent rolled edges.

The double-tuck-stitch pattern in Cecilia’s Bosom Friend is pattern number 26 in Nancy Marchant’s book. All tuck-stitch terminology and abbreviations are developed by Nancy. You don’t need the book to knit a bosom friend, but I highly recommend it as a very well-structured book with step-by-step stitch instructions and as a lovely dive into the world of tuck stitches.

FIBER NOTES

For this project, I had the perfect wool candidates—a white Värmland fleece and a variegated gray Värmland. Värmland sheep are a Swedish heritage breed with a combination of soft undercoat and strong, shiny outercoat. These fleeces have slightly more undercoat than outercoat. Blending it all together in a



Sportweight, lightly fulled singles yarn spun on floor-supported Navajo-style spindles

singles yarn creates a soft yet relatively strong yarn with some subtle shine.

You can use any reasonably soft dual-coated fleece or a combination of undercoat and outercoat fibers from different breeds. Just make sure that the difference in length isn't too great between the undercoat and outercoat fibers. One approach is to create a sliding scale of fiber lengths. For example, if the shortest undercoat fibers are 5 centimeters and the longest outercoat fibers are 15 centimeters, make sure there are fibers in lengths in between as well. This will make the fibers marry each other better.

When it comes to color, there is so much you can play with in this pattern. You can choose a solid dark color or a variegated fleece, or mix colors from several fleeces. You can, of course, also use dyed wool in one or more shades or colors. Find a combination that works for you. The important thing is that there is contrast between the two yarns—one light color (LC) and one dark color (DC). I chose four shades of gray from my variegated gray fleece and spun one rolag of each color at a time and in the same sequence throughout the whole yarn.

SPINNING NOTES

I spun my singles yarns with two floor-supported Navajo-style spindles, but you can use other spinning tools as well. The advantages of the floor-supported Navajo-style spindles are the slowness and the opportunity to make long draws that are really long.

I divided the gray wool into four shades of gray and processed them separately. Before carding the wool into rolags, I teased it with combs.

When I spin on any kind of spindle, I always spin clockwise with my right hand and counterclockwise with my left hand. This is for ergonomic reasons. By alternating the two yarns when spinning and by spinning the yarns in different directions (and thereby with different hands), I kept my body in balance and avoided strained shoulders.

I chose to spin the white yarn clockwise. Since the yarn twists slightly clockwise in my continental knitting style and the pattern uses twice as much light yarn compared to dark yarn, I figured this would give the most durable and balanced result.

I kept the yarn to a 30-degree twist angle and 12 wraps per inch (sportweight). To set the twist and give

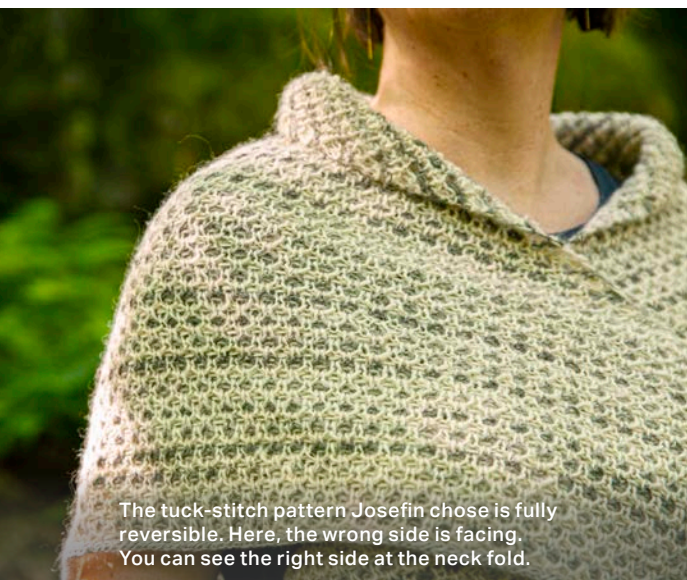
What Is a Tuck Stitch?

Nancy Marchant explains, "Tuck stitches are created using slipped stitches. When we slip a stitch in tuck knitting, instead of carrying the working yarn across the front or across the back of a slipped stitch, we carry the yarn over the stitch, giving that slipped stitch a shawl. This action is called a *sl1yo*. In the following row, we can work this slipped stitch and its accompanying yarn over together. If the stitch and yarn over are knitted together, this is called a brioche knit (*brk*) or if they are purled together, this is called a brioche purl (*brp*). We are tucking that stitch. In brioche knitting, every stitch is tucked; the entire fabric surface is covered with single tuck stitches."

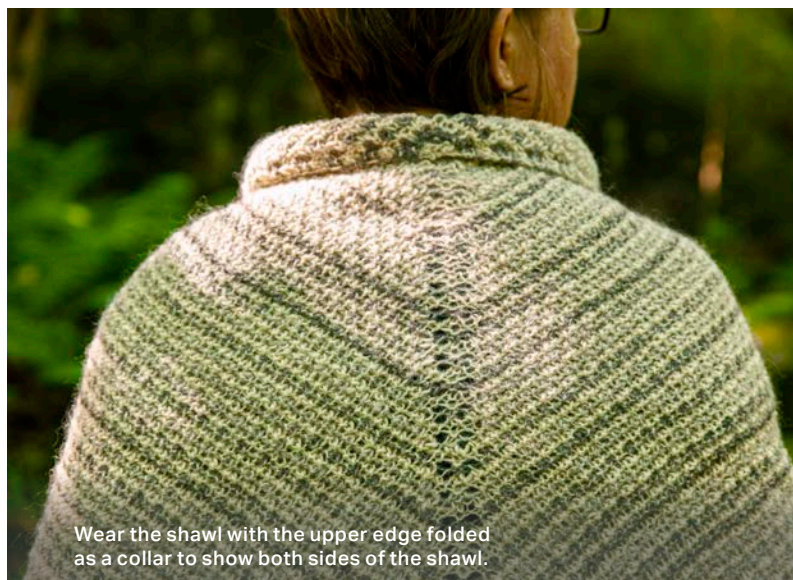
But it doesn't end there! Nancy goes on, "Instead of brioche knitting or brioche purling the stitch in the following row, we can slip the stitches again and give it another yarn over. This is called *sl1¹yo*. After working a *sl1¹yo*, we will see a single stitch topped with two yarn overs." In the stitch pattern I have chosen for this design, you work two rows of slipped stitches (two yarnover stitches on the original stitch) before the brioche-stitch tuck row.

To learn more about tuck stitches and Nancy's notation system, check out *Tuck Stitches: Sophistication in Handknitting* (2017).





The tuck-stitch pattern Josefin chose is fully reversible. Here, the wrong side is facing. You can see the right side at the neck fold.



Wear the shawl with the upper edge folded as a collar to show both sides of the shawl.

the yarn a round shape and more solid texture, I fullled it by dipping it alternately into cold and hot water until I could feel the yarn becoming just slightly tighter. I stopped the process when the strands started to want to cling to each other. The fulling only marginally shrank the yarn.

For the I-cord bind-off and tie, I used the gray Värmland wool to spin a two-ply sportweight yarn that also measured 12 wraps per inch. I wanted a solid color, so I chose to blend the grays into a medium silver. I combed the wool (undercoat and outercoat together) and spun it with a short draw on a spinning wheel. For both the bind-off and tie, it is important that the yarn weight matches the rest of the project and that the yarn is durable. I recommend combing and short-draw spinning for a sleek look and defined stitches.

MATERIALS

Fiber 19½ oz raw white Värmland fleece and 16 oz raw variegated gray Värmland fleece. The weight is based on an approximate yarn yield of 35% from raw fleece to finished yarn. Note that the yarn is lightly fullled, so the fiber must be able to felt.

Yarn Lightly fullled singles: 765 yd light color (LC) Z-spun, 385 yd dark color (DC) S-spun; 1,240 ypp; 12 wpi; sportweight.

2-ply for I-cord ties and bind-off, worsted-spun: 66 yd light color (LC); 720 ypp; 12 wpi; sportweight.

Needles Size 6 (4 mm): 32" (80 cm) circular (cir). Size 4 (3.5 mm): set of 2 double-pointed (dnp). Adjust needle size if necessary to obtain the correct gauge.

Notions Markers (m); tapestry needle.

Gauge 20 sts and 46 rows = 4" in Tuck charted patt with LC/DC yarn on larger needle; 22 sts and 30 rows = 4" in St st with LC/DC yarn on larger needle.

Finished Size 63" × 24". Modeled by Josefin, see Notes.

Visit spinoffmagazine.com/spin-off-abbreviations for terms you don't know.

Notes

- This winged triangular two-color tuck-stitch shawl has I-cord ties and an I-cord bind-off, with tassels at the center point and the ends of the I-cord. The shawl is reversible. It begins at the center back neck with a garter-stitch tab and increases at each side of a single center stitch and at the beginning and end of rows.
- When changing colors, make sure to carry the new color to the front and the old to the back. It's important to carry the unused yarn loosely along the edge. If it is pulled too tightly, the left and right edges of the shawl will be uneven.
- Always work increase stitches into the tuck pattern.
- The upper edge is straight or slightly convex and doesn't follow the shape of the neck. For a better fit, you can choose to fold the edge at the neck and show both sides of the fabric.
- The pattern is one size (shown on Josefin, a EU size 38; US size 8). However, there are several ways you can alter the size to fit your needs. You can:
 - Tie the shawl in the front or in the back.
 - Increase or decrease the number of pattern repeats before and/or after you start the shaping.
 - Add or subtract length to the I-cord ties.

- Also, the shawl is quite elastic, and you can wear it tight or loose depending on your preferences.
- To determine your size, measure in a figure eight around your neck, crossed over your chest and around your back just underneath your bottom ribs. This measurement should approximately match the finished width measurement. You can wear the shawl with different degrees of wrapping. Josefin's fits so the ends meet at the center back. You can also wear it so the ends double at the back. The ends don't have to meet, but they should at least go around the side ribs.

SHAWL Garter Tab

With larger needle and LC, CO 2 sts.

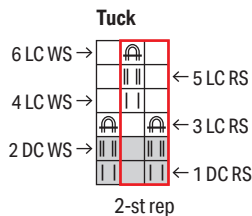
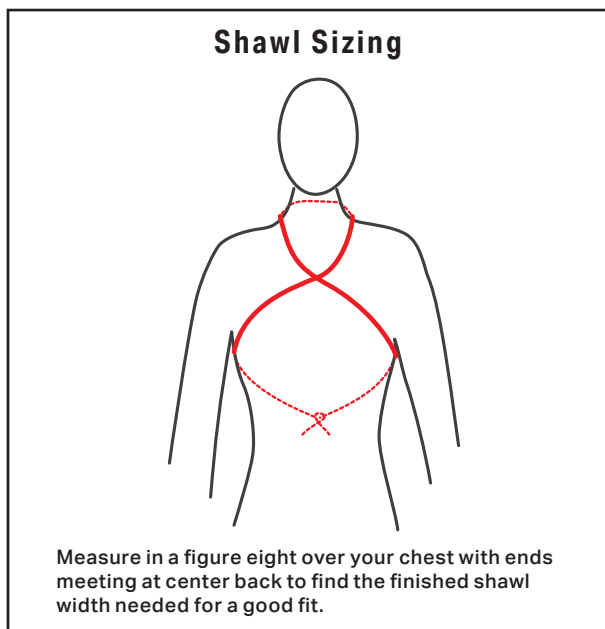
Work 5 rows in garter st.

Next row (WS) K2, working along selvedge edge, pick up and knit 3 sts (1 st in each garter ridge), then pick up and knit 1 st in each CO st—7 sts total.

Set-Up Rows

Row 1 (RS) With DC, k2, place marker (pm), yo, k1, yo, pm, k1 (center st), pm, yo, k1, yo, pm, k2—11 sts.

Row 2 (WS) With DC, k2, sl m, work Row 2 of Tuck chart to m, sl m, k1, sl m, work Tuck chart to m, sl m, k2.



Key

□ LC

■ DC

□ k on RS, p on WS

□ sl1yo: sl 1 pwise wyf, yarn over needle to back

□ sl1yo: sl st and yo pwise wyf, yarn over needle to back

□ brp1²: pur1 st and 2 yo tog on RS, knit st and 2 yo tog on WS

□ pattern repeat

Row 3 With LC (see Notes), k2, sl m, yo, work Row 3 of Tuck chart over 3 sts, yo, sl m, k1, sl m, yo, work Tuck chart over 3 sts, yo, sl m, k2—15 sts.

Rows 4–6 With LC, k2, sl m, work Tuck chart to m (see Notes), sl m, k1, sl m, work Tuck chart to m, sl m, k2.

Pattern Repeat

Row 1 (RS) With DC, k2, sl m, yo, work in patt to m, yo, sl m, k1, sl m, yo, work in patt to m, yo, sl m, k2—4 sts inc'd.

Row 2 (WS) With DC, k2, sl m, work in patt to m, sl m, k1, sl m, work in patt to m, sl m, k2.

Row 3 With LC, k2, sl m, yo, work in patt to m, yo, sl m, k1, sl m, yo, work in patt to m, yo, sl m, k2—4 sts inc'd.

Rows 4–6 With LC, k2, sl m, work in patt to m, slm, k1, sl m, work in patt to m, sl m, k2.

Rep last 6 rows 16 more times—151 sts; piece measures about 12" along center st.

Shaping Repeat

Row 1 (RS) With DC, k2, sl m, yo, M1R, work in patt to m, yo, sl m, k1, sl m, yo, work in patt to m, M1L, yo, sl m, k2—6 sts inc'd.

Row 2 (WS) With DC, k2, sl m, work in patt to m, sl m, k1, sl m, work in patt to m, sl m, k2.

Row 3 With LC, k2, sl m, yo, M1R, work in patt to m, yo, sl m, k1, sl m, yo, work in patt to m, M1L, yo, slm, k2—6 sts inc'd.



The ends meet at the back underneath the body of the shawl on Josefin.

Rows 4–6 With LC, k2, sl m, work in patt to m, slm, k1, sl m, work in patt to m, sl m, k2.

Rep last 6 rows 15 more times—343 sts; piece measures about 24" along center st.

Do not BO; set aside.

I-Cord Tie and Bind-Off

With 2-ply yarn, smaller dpn, and leaving a 20" tail, CO 3 sts. Work I-cord for 20".

Next row K2 I-cord sts, with RS of shawl facing, k2tog tbl (last I-cord st tog with first st of shawl), slide 3 sts to other end of dpn.

Attached I-cord row K2 I-cord sts, k2tog tbl (last I-cord st tog with next st of shawl), slide 3 sts to other end of dpn.

Rep last row once more.

Unattached I-cord row K3 I-cord sts, slide 3 sts to other end of dpn.

Cont in patt, working 3 rows of attached I-cord, then 1 row of unattached I-cord, to center st.

Work 1 row of unattached I-cord.

Work 1 row of attached I-cord (joining to center st).

Work 1 row of unattached I-cord.

Cont in patt, working 3 rows of attached I-cord, then 1 row of unattached I-cord, to end of shawl.

Work I-cord for 20".

BO all sts. Break yarn, leaving a 20" tail.

FINISHING

Tassels

Make two 3½" tassels with 2-ply yarn and one 3½" tassel with LC and DC yarn tog. Use tails to attach 2-ply tassels onto I-cord ends. Attach LC/DC tassel to center st point of shawl.

Weave in ends. Block to measurements. ●

Resources

Brioche Stitch, briochestitch.com.

Josefin Waltin Spinner. "A Coloured Fleece." April 20, 2021. waltin.se/josefinwaltinspinner/a-coloured-fleece.

Josefin Waltin Spinner. "Fulling Singles." April 17, 2021. waltin.se/josefinwaltinspinner/fulling-singles.

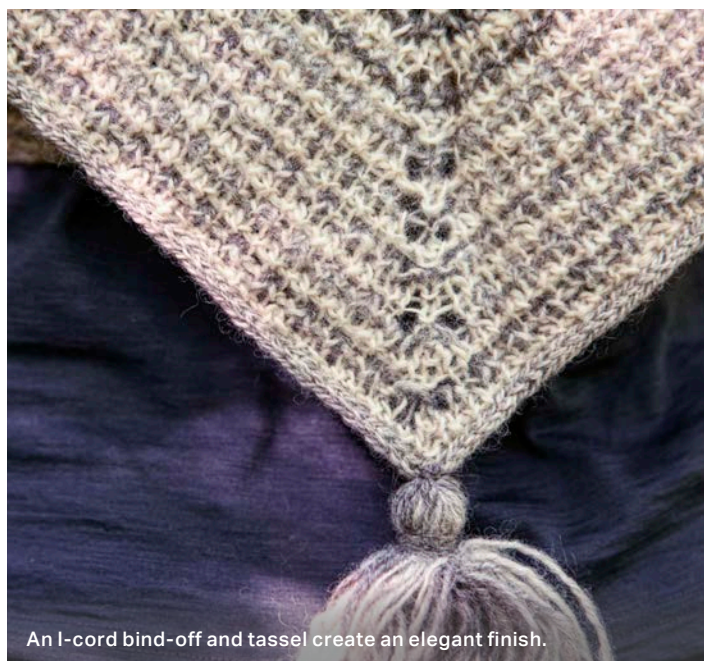
Marchant, Nancy. *Tuck Stitches: Sophistication in Handknitting*. Self-published, 2017.

Josefin Waltin started spinning in 2011. She is a spinning teacher, offering workshops both online and offline, mainly in spindle techniques and the process from raw fleece to finished yarn. Josefin publishes instructional and documentary-style videos, and she manages a spinning blog from her home in Sweden at waltin.se/josefinwaltinspinner.

Photo by Josefin Waltin



Josefin (right) with her cousin Cecelia in handknitted *hjärtevärmare*. Read more about how these two spinners reconnected in *Spin Off*, Fall 2020.



An I-cord bind-off and tassel create an elegant finish.

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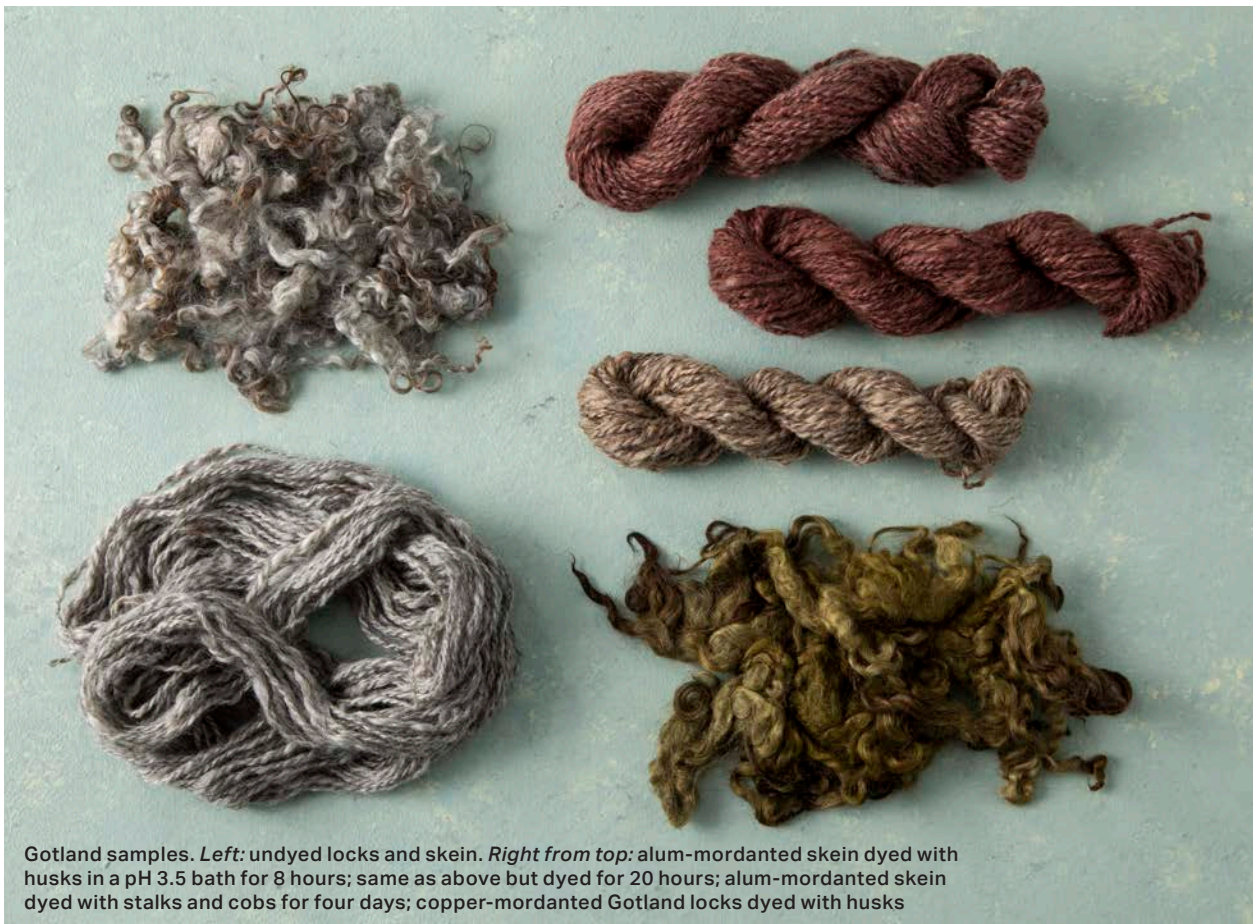
In the chilly months of winter, I love to curl up with a hot beverage and my woolens, pore over my favorite seed catalogs, and dream up a plan for next year's garden. A few years ago, while looking at a catalog from Seed Savers Exchange, I was struck by a photo of a gorgeous, gnarly-looking flint corn: Seneca Red Stalker. After reading the description, I knew I'd have to try it out in the coming spring.

I'd fallen in love with heirloom and open-pollinated corns a couple years before. I am always blown away by the variety of shapes, sizes, colors, and uses for different types, and I'm startled by how much taller they can seem to grow in just a couple days. When I planted my Red Stalker corn, the seedlings took on their own personalities right away: all of the plants' leaves remained a vibrant green, but the other parts of each plant took on a signature color. The stalks ranged from red to

red-violet to almost midnight black. A handful remained plain-Jane green.

As they grew taller and taller, up beyond my head, the midnight-black plants became my favorite ornamental. They were so striking with their violet-black stalks ringed with lively green at each leaf node. With my corn patch right by the house, the color and beauty of these plants cheered me up every time I walked by or looked out the window.

Harvesting corn from this plant is always special. In 2019, I invited a handful of friends over for a Fall Equinox celebration, and as part of it, we picked and shucked the Seneca Red Stalker corn. Shucking an ear of this corn feels like opening a present; you never know what colors and patterns you will find. Some offer vivid rows of red and black; others have a rainbow of blues, yellows, and purples; and many have special kernels striped in red and yellow or red and white.





For fiber artists who also love to grow their own food, this plant has it all. It's a lovely garden ornamental and a unique seasonal decoration; it makes great hominy, cornmeal, or livestock feed; and it offers up rewarding color. Seed can be ordered from Seed Savers Exchange, a non-profit in Iowa.

At our house, we dry and shell the corn and save it to make a traditional wood-ash hominy or mill it for cornbread. We've also found it makes a favorite snack for our ever-hungry horde of ducks.

THE GIFT OF COLOR

After harvesting the corn one year, I saw that the morning dew had pooled on a leftover husk on the ground, creating a vibrant pool of red-violet liquid, and I had a lightbulb moment. I quickly fished the rest of the husks off the top of our compost pile and fetched the dyepot. With some experimentation, I was able to create dyepots yielding beautiful reds, pinks, and purples. The colors I got from these husks turned me into a Seneca Red Stalker devotee.

I have been experimenting with the dye potential of Seneca Red Stalker for several years, and in 2020, I gifted some seed to my fiber friend and ally, Chloe Valentine of Torrey, Utah. Her different approach to dyeing, different water, and different growing

conditions have given me a fuller picture of this dye plant, which I'm thrilled to share here. There are still a lot of unknowns—we don't yet know about the long-term lightfastness and colorfastness, although both our samples have held up well so far!

I moved to a new home in December 2020 and was not able to grow corn in 2021. However, I had dried and saved the husks from my 2020 patch of about 50 plants for later. Those old husks were about a year old when I used them to create the samples in this article. I also couldn't bear to part with the colorful plant stalks in 2020. I stripped the most colorful of their leaves, dried the stalks, and bundled them for later use. I also saved some corncobs. The cob under the kernels is a lovely red or purple.

Dyebath #1: Stalks and Cobs

Until now, my focus had been on using husks for dyeing, but for this article, it was time to experiment with other parts of the plant. Because the color varies so much from plant to plant and because the color is concentrated in the outermost layer of the stalks, I didn't worry about weighing dyestuff. Instead, I threw all the cobs I had in my dyepot and chose my most colorful stalks and threw them in, too, after breaking them into manageable 6-inch pieces. I packed the pot "chock-a-block full," as my mother would say, and poured hot water in to fill the nooks and crannies. At first, my dry dyestuff floated up out of the pot. To wrangle it, I found a smaller stainless steel pot, filled it partway with water, and used it as a weight on top of the stalks until they'd absorbed enough water to stay submerged on their own.

Because I work outdoors with propane and like to conserve fuel, I simmered the dyestuff off and on, letting the thermal mass of the pot help extract color when the heat was off. I planned to let color extract for 24 hours or so, but life around Thanksgiving time was very full. The bath sat for about four days, with heat applied off and on. I filtered out the plant matter with a beer brewer's strainer (an amazing tool for natural dyeing!) and was left with a dark red-brown dye liquid.

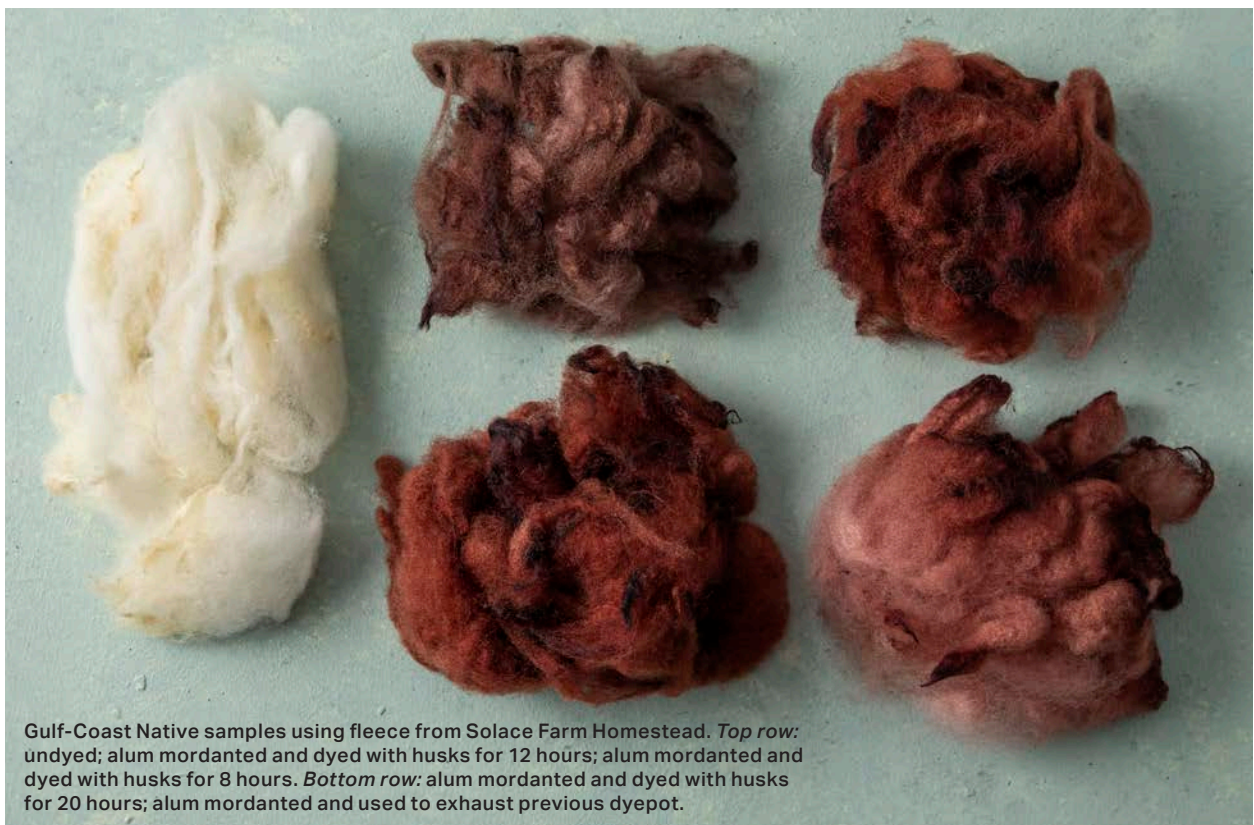
My last home was on spring water, and I currently work with well water. However, both water sources



Finnwool samples spun from Humbug Finn top from Paradise Fibers. *From top:* undyed; alum mordanted and dyed with stalks and cobs for four days; alum mordanted and dyed with husks for 8 hours; same as above but dyed for 20 hours



From top: undyed Border Leicester fleece; alum-mordanted Border Leicester fleece dyed with husks for 8 hours; alum-mordanted Romney fleece dyed with stalks and cobs



Gulf-Coast Native samples using fleece from Solace Farm Homestead. *Top row:* undyed; alum mordanted and dyed with husks for 12 hours; alum mordanted and dyed with husks for 8 hours. *Bottom row:* alum mordanted and dyed with husks for 20 hours; alum mordanted and used to exhaust previous dyepot.

yielded similar results. My current water source is soft water with an acidic pH of about 6. For this dyebath, I did not adjust the pH. I threw in wetted wool skeins of variegated Finnwool and gray Gotland, and raw fleece from a bright white Romney named Sugar; all were previously mordanted.* I heated my dyepot to 180 degrees and applied heat as needed to keep the temperature between 160 and 180 degrees. I dyed in the evening, let the pot cool overnight, heated it again in the morning for a while, and then let the fiber cool for another 12 hours or so.

The results were lackluster. Stalks and cobs certainly have color to offer, and I *do* very much like how my Finnwool skein turned out, but the color is pale and unremarkable compared to what the husks give. I will never again painstakingly strip, dry, and bundle stalks. They will go into the compost heap!

Dyebath #2: Husks

The husks are where the magic is. In a planting, they are abundant and pretty uniform in their red-violet color. They also retain their color when dried and stored for later use. Open-pollinated varieties of corn such as this one usually have two or even three ears per stalk, meaning lots of husks for dyeing.

To extract the color, I shred the husks along the grain to help the color leach out and fill the dye pot with an equal weight of dyestuff to the fiber that I plan to dye.

(For example, I use 8 ounces of dried husks to dye 8 ounces of mordanted wool.) I bring a full teakettle to the boiling point and pour the contents over the husks to make a tea-like infusion. After this sits for a bit, I heat the pot back up and simmer for a while. It's interesting to note that I have tried heating the husks with a gentler heat as I would with madder, not letting the temperature exceed 170 degrees, but I did not notice a serious difference in color. After I have a dark, rich cherry-red bath, I filter the bath with my trusty brewer's strainer.

Acid Modifier Based on previous experience, I expected that lowering the pH (making it more acidic) would shift a red-violet toward red. For this test batch, I used guidance from Joy Boutrop and Catharine Ellis's fabulous natural dye book (see Resources) to know how acidic I should make the bath. My specific dyestuff was not listed, but I turned to their advice regarding another dye known for reds and purples: cochineal. For an intense red (rather than purple), they recommend adding citric acid to get a dyebath with a pH of 3.5 to 5. I followed their directions and added citric acid (from the canning section of my grocery store) to get a bath of about pH 3.5. I put in my wetted, alum-mordanted wool* and heated my pot to the 160- to 180-degree range.

This is not an instant gratification dye like madder or marigolds. Color strike is slow, so don't be disappointed if only the palest pinks show up after a bit. I

Seeing Red

The first time I dyed with these husks, I had a hunch that making the bath more acidic would give me red rather than purple. I used to work for a local body-care business as a handmade-soap maker and production manager. I'd found a simple trick for testing a soap's pH using juice extracted from red cabbage. The cabbage juice, which is a purple liquid, was dropped on the bar of soap in question, and if it stayed purple or shifted to red, the bar was safe. If the juice shifted to blue, the bar was basic. If the juice shifted to very dark blue, the bar could be dangerously alkaline, and the batch should perhaps be discarded. Knowing that acidity could shift some purple liquids to red, I tried this trick on my first dye venture and was met with great results.



walked away for a while, worked on some sheep fencing, and checked the pot about eight hours later. I was thrilled with the colors: My Finnwool skein and Romney fleece were both a lovely mauve red, and my gray Gotland had turned a gentle plum-lavender color. I took samples out of each, put the remainder back in the pot, reheated for a while, and then let the pot cool overnight. By the next day, my colors had turned a shade darker, and I removed my wool from the pot. I allowed the samples to dry fully before final rinsing.

CHLOE'S RESULTS

Seneca Red Stalker *does* appear to be sensitive to pH and water hardness, so fibers dyed with this material should be washed only with a neutral detergent. Chloe Valentine, who grew the corn in Utah while I grew it in North Carolina, got different results in her area.

Living in Orem, Utah, at the time, Chloe worked with hard, municipal water. She tested her bath with pH strips and got readings of 4 or 5, but her wool skeins turned slate blue! After dyeing her skeins, she threw some silk noils in to exhaust the bath and let the bath ferment for a few days. The result was a purple that she has since spun up, and it has stayed lightfast and colorfast. This all leads me to believe that water hardness has a big impact on color. For a 10-minute discussion of Chloe's experience growing this corn and working with the dye, check out her fiber arts craftcast, *Vegetables Matter* (see Resources).

THE WORK CONTINUES

Other colors can be pulled from this plant, too. Without shifting my dyebath pH, I've gotten a muted plum color on white wool, and by mordanting some of my Gotland with copper, I've even gotten a mossy green. There is a lot of room for experimentation with a range of pH, water hardness, dyeing with different mordants, and working with other fiber types.

In the end, we'd love to see other fiber artists join in a "grow-along" and add to what we know about this plant. Several seed companies offer Seneca Red Stalker, and for folks who would prefer to grow a sweet corn, Double Red corn bred by Alan Kapuler appears to be a related variety with a similar red-violet husk.

Chloe raised Seneca Red Stalker in Utah, and the results from her dyepots were very different from Meghan's in North Carolina, even with the same mordant, process, and pH range. *From top:* Ball of Corriedale that came out of the dyepot a slate blue; purple Corriedale; lavender (exhaust) skein spun from silk noil; and mitts knitted with Seneca Red Stalker colors and additional natural dyes



We would love to have you join us, and I hope your colors are delightful. ●

* Alum-mordanted samples were treated with aluminum potassium sulfate at 10% weight of goods (WOG) and cream of tartar at 5% WOG.

References

- Boutard, Anthony. *Beautiful Corn: America's Original Grain from Seed to Plate*. Gabriola Island, BC: New Society Publishers, 2012.
- Boutrup, Joy, and Catharine Ellis. *The Art and Science of Natural Dyes: Principles, Experiments, and Results*. Atglen, PA: Schiffer Craft, 2019.
- Seed Savers Exchange, seedsavers.org.
- Valentine, Chloe. *Vegetables Matter* craftcast. "Fall Colors." Episode VM (23) Oct/Nov 2020. youtu.be/t3P93TA4zvA.

Meghan Weaver Smith's family has been raising sheep in Idaho for several generations, and her interest in sheep and wool was first sparked by her mother's tales of misadventure with the family flock of Panama sheep. She loves to grow and forage for dye plants and is most intrigued with the plants that offer not just color, but food or medicine as well.

Diz Is How I Use the Blending Board

KIM MCKENNA



Photos by Matt Graves unless otherwise noted

Create complex, variegated semisolid colors for the Ancient Earth Shawl. Shown in Kim's Aphanite colorway

Until we downsized in 2017, I was before all else a dyer. Mixing dyes for that one perfect color was a thrill like none other. After we downsized, I no longer had room for everything that used to fit into our home and my studio. To my surprise, my new limitations pushed my creativity rather than hampered it.

To help strike a balance between my yearning to create color and my new situation, I turned to my blending board. Today, my jars of dyestock and auxiliary materials, dye pots, and measuring equipment have been replaced with single-color dyed rovings, handpainted braids, and a few natural-colored fibers. The color lessons I learned

over the years from the dyepot are now applied to the blending board. And the time I save in presoaking, dyeing, and drying fiber affords me more time for spinning and, more recently, designing my own patterns.

Most often, I use my blending board to create yarns that appear to be a single color. Closer inspection, however, reveals that they are composed of several colors. Such is the beauty of blending rich, complex colors that will go well with so many other colors in a palette.

If you are not yet confident when it comes to color, one way to start is to use handpainted braids; they are perfect because the dyer has already done the lion's share of the color theory work for you. When you have learned more about your personal palette and some basic color theory, you can begin developing your own unique colors. I'll show you how to do just that using a blending board and diz, solid-color roving, and handpainted braids.

SMOOTH FIBER PREPARATIONS

I use only my hands to load the fiber onto the board. I do not normally use a blending brush because it causes the fiber to mat ever so slightly, and I prefer to work with the smoothest fiber preparation possible. Why? Because when I spin using either a woolen or a worsted draft, I enjoy the feel of a smooth fiber prep running through my fingers and the smooth yarns that are created. Further, when the fiber preparation is not matted, it does not strain my hands as I doff the fiber from the board. This is not to say I never use a blending brush. I find the blending brush indispensable when cleaning the blending board. It is also an extremely useful tool for very short or fine fiber, such as cashmere.

KIM'S COLOR-BLENDING PROCESS

My preference is to work with a blending board clamped directly to a table. After removing the keel, I clamp the board to the corner of a table. I am right-handed, so I load the board with the handle to my left and the toe to my right. Using 8- to 10-inch lengths, I pull the roving across the surface, left to right. (If you prefer working in the opposite direction, reverse the instructions below.)

This method of color blending using a blending board and diz is a one-step process when less color

blending is required and a two-step process when more blending is required.

One-Step Process

Load the fiber in four to five horizontal rows no wider than the diameter of your diz. You can control how much fiber is laid down in one pass. Thinner layers increase color blending, while thicker layers allow colors to be more distinct (less blended) in the final yarn. To lay down the thinnest wisp of fiber possible, hold the end of the roving almost parallel to the board and gently drag it across the teeth. To lay down more than a thin veil of fiber in one pass, use your left hand to follow the roving across the surface of the board, helping the teeth grab more fiber as you work. To add even more fiber, use roving that has been split lengthwise into a tape (strip) of fiber about the width of your middle finger.

To facilitate dizzing, load the fiber in thin layers and don't be tempted to overload or pack the blending



There is less blending with the One-Step Process because fiber is applied to the blending board only once. The neat rows of fiber should be about as wide as your diz.

Photo by Kim McKenna



Use a diz to remove fiber from a blending board to create a smooth prep.

board as full as you can. If the fiber does not load onto the board well, take a look at your grip. A light grip will help the teeth to pull the fiber from your hand. Sometimes after several passes, the end of the roving becomes fanned out and does not load onto the board as well as it did for the first few passes. To remedy this, adjust your grip; turn the fiber in your hand and load the board using another “side” of the roving. If that doesn’t help, switch ends.

When loading the board, you should not be able to see through to the carding cloth, and the fiber should be nicely embedded in the teeth. If there are a few spots here and there where the fiber sits above the teeth, don’t worry. Those areas will be pulled down and through the teeth as you work with the diz. Once the board is loaded, tidy the fringes by giving a slight tug on the fringe of each column.

When you are ready to diz, move the board so it is positioned with the toe edge closest to you. I still keep it clamped to a table. With the inward curve of the diz facing the board, thread the fringe through the diz. Working a little lower than the board, diz the fringe

fiber. As you deplete the fiber in the fringe, you will see the fiber just inside the toe edge begin to thin out. Once this area has thinned out, bring the diz in line with the top of the teeth, tilt the diz forward, and place it face down on the teeth. Continue to work toward the top of the board with the face of the diz placed on the teeth using the following motions:

- **Step 1:** The drafting hand will slide the diz forward while the other hand cradles the dizzed fiber to keep the roving off the board. With the drafting hand, slide the diz forward a short distance with the thumb and index finger. Stop.
- **Step 2:** Using the thumb and index finger of the drafting hand, pinch the fiber at the orifice and then, with the help of the middle finger, apply a little pressure to the diz while you slide the diz back toward you a short distance. As you pull back, you should see the fiber being pulled through the teeth. This is key to creating a smooth blend.
- Repeat from step 1. As you do so, gently guide the dizzed fiber up through the orifice with your fiber hand.

Choosing a Diz: Orifice Size

My choice of orifice size depends upon the grist of the singles I wish to spin. The smaller the orifice, the finer the singles. Further, the smaller the orifice, the less fiber I load onto each row. You will know if you have loaded too much fiber if it proves difficult to diz. The diameter of the orifice also affects the way the colors will blend. The smaller the orifice, the more the colors blend.



Kim selects a diz for a particular project based on the grist of the singles she wishes to spin. Smaller yarn, smaller orifice. Dizzes created by Bob Askev.

Photo by Kim McKenna

Project Planning: The Aphanite Colorway

I created two versions of the Ancient Earth Shawl (see page 52) so you could see how solid and handpainted fibers can be blended using this diz and blending board method. Each began with notes and a “blueprint” to keep track of the colors used and the order in which they were blended. *Visit our website to see Kim’s shawl blueprint and planning notes.* —Editor

I wanted a greater degree of blending for Colors A and B, so I followed the Two-Step Process. I wanted less blending in Colors C and D, so I used the One-Step Process.



Photos by Katrina Stewart



A



B



C



D

The aphanite colorway began with two handpainted braids from Crafty Jaks.

Kim pulled the color sections of two handpainted braids apart. Then she used these sections to create four separate blends.

Color A is a two-step blend of sections 2 and 3.

Color B is a two-step blend of section 1.

Color C is a one-step blend of section 4.

Color D is a one-step blend of sections 5 and 6.



The Two-Step Process begins by creating batts that blend the various fibers you plan to mix into one semi-solid color.

Photos by Kim McKenna



The diz makes short forward and backward movements as you work from one end of the board to the other. When sliding back a short distance, the fiber is drafted through the teeth. When moving the diz forward, the drafted fiber can be gently guided out of the diz orifice.

Two-Step Process

Step 1 Load the fiber onto the board as in the One-Step Process. This time, however, you will load the entire surface. Load thinner layers if you want well-blended color and thicker layers if you want the colors to remain a little more distinct. Once loading is complete, place a sheet of plastic over the surface and use two dowels to doff the batt from the board. Don't try to pull the fiber through the teeth; simply roll the fiber from the board's toe to top. When done, gently unroll the fiber so that the plastic is on the bottom and re-roll from side to side so that the fibers run parallel to the length. Repeat until all of the fiber you plan to blend into the same color has been prepared.

Step 2 Pull a lengthwise strip from each roll created in Step 1 and reload the blending board in rows (as in the One-Step Process). Before reloading a strip, use your hands to give it a few gentle tugs along its length. Tidying up the length of fiber in this way helps the fiber load onto the board. Now you can continue to load and doff the fiber as in the One-Step Process.

TIPS FOR COLOR BLENDING

When you pull out sections of color from a handpainted braid, a little of the color from either side ends up in the blend as well. This makes for luscious color blends without having to add other colors. Although one braid alone holds several avenues to explore, you may wish to work with more than one braid in more than one colorway. Keep the following points in mind when blending.

- To lighten a color, add white or a lighter hue in the same family.

- To darken a color, add black, brown, or a darker hue in the same color family.
- It does not take much for a dark color to shift the direction of a lighter color.
- To desaturate a color, add gray or a touch of that color's complement.
- When using complements in blends, avoid creating mud-like colors by allowing one color to lead and the other to follow. By this I mean avoid using complements of the same value and intensity in equal proportions. Know your complementary pairs. Joen Wolfrom's 3-in-1 Color Tool is an excellent resource.

The best thing you can do with your blending board is play. Don't let color theory intimidate you. Follow your intuition and listen to those gentle prompts that come to mind like "I wonder what would happen if I added this to the blend?" Work with colors that appeal to your senses, blend your own colors, and create your own palette. This is how you will find your chromatic voice and mix colors that make your heart sing. ●

Resources

Joen Wolfrom, joenwolfrom.com.

McKenna, Kim. *Nuances to Spinning Better Yarn*. Online course, 2022. schoolofsweetgeorgia.com.


Kim McKenna is constantly learning, researching, and experimenting. She enjoys sharing her discoveries and methods through writing and teaching. Kim teaches virtual workshops through Sanjo Silks, as well as in-person workshops through SweetGeorgia Yarns and the Coniagas Textiles' Handspinning and Fleece School. Kim also instructs at the School of SweetGeorgia, an online membership-based fiber arts school. You can find her at claddaghfibrearts.com and on Instagram @claddaghfibrearts.

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Learn to create sophisticated, project-scale blends using a blending board. Get started with this elegant triangle shawl!

Ancient Earth Shawl

KIM MCKENNA

Ancient Earth is a versatile pattern. This elegantly simple triangle shawl can be knitted using a wide variety of handspun yarns, but its smooth stockinette-stitch body is ideal for showing off complex variegated, semisolid blends.

I created two different colorways using a blending board and diz to explore color-blending potential: the aphanite colorway is from handpainted fibers (see page 46) and the glacial flour colorway shown here is from undyed and dyed solid colors.

SPINNING NOTES

Two fiber preparations were used for the glacial flour colorway. The main color was a dyed Merino/alpaca blend with a 67%/33% ratio. I stripped the fiber into thinner lengths and attenuated (predrafted) before spinning. Then I blended the accent colors using the One-Step Process detailed on page 47 with dyed-in-the-wool Merino fiber and a variety of silks. I spun the yarns for each shawl using a backward-worsted draft.

KNITTING NOTES

I knitted the aphanite version of this shawl using the continental knitting method, and I would say my gauge is more on the loose side. My good friend Aja Ramsey test-knitted this pattern in the glacial flour colorway. Aja is a meticulous knitter who knits English-style on the tighter side. The different ply structure and knitting styles produced two fabrics of slightly different character. The two-ply yarn used in the aphanite colorway has more drape and a bit more textural surface interest, and the lace remains nice and open. The three-ply surface of the glacial flour colorway is smoother, the stockinette stitches fill in nicely, and the lace has a fuller honeycomb look to it. Both create beautiful shawls, so see which you like best! The project instructions included here are based on the glacial flour version of the Ancient Earth Shawl.

MATERIALS

Fiber MC: 6¼ oz Chaotic Fibres 67% Merino/33% alpaca in Matterhorn blue.

CC1: 1½ oz total in a blend of Foxglove Fiberarts 100% Merino top in chartreuse, sea foam, and Dijon; Chaotic Fiberarts 67% Merino/33% alpaca in Matterhorn blue; 100% Merino in natural white; Sanjo Silk 100% red eri silk in natural; Sanjo Silk 100% yellow bombyx silk in natural.

CC2: ¾ oz total in a blend of Foxglove Fiberarts 100% Merino top in jade, café au lait, and peacock; Chaotic Fibres 67% Merino/33% alpaca in Matterhorn blue; Sanjo Silk 100% tussah silk in natural.

CC3: 1½ oz total in a blend of Foxglove Fiberarts 100% Merino top in bitter chocolate, myrtle, peacock, and spice; Chaotic Fibres 67% Merino/33% alpaca in Matterhorn blue; Sanjo Silk 100% peduncle tasar silk in natural brown.

Yarn 3-ply; 470 yd MC (turquoise), 110 yd CC1 (light green), 55 yd CC2 (blue-green), 110 yd CC3 (brown); 1,200 ypp MC, 975 ypp CC1–CC3; 14 wpi MC, 12 wpi CC1–CC3; sportweight MC, DK-weight CC1–CC3.



Create complex color blends with a blending board.



Needles Sizes 6 (4 mm) and 7 (4.5 mm): 40" (100 cm) circular (cir). Adjust needle size if necessary to obtain the correct gauge.

Notions Markers (m); tapestry needle.

Gauge 19 sts and 30 rows = 4" in St st with MC on smaller needle.

Finished Size 57" × 25".

Visit spinoffmagazine.com/spin-off-abbreviations for terms you don't know.

Notes

- This triangular shawl is worked back and forth from the center neck down and outward to the points.

STITCH GUIDE

K1f&b: Knit into front of st with one strand, then knit into back of same st with the other strand.

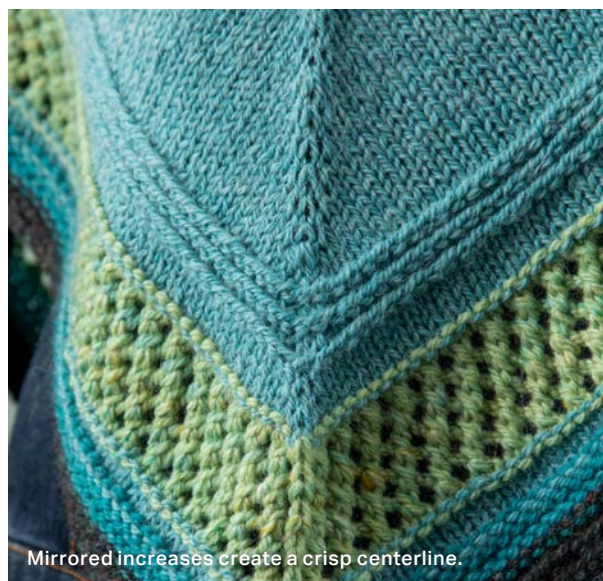
Twined Knitting: Wind two equally weighted balls, one from each end of the skein. Designate one ball as strand A and the other ball as strand B. (If you leave the two balls connected and use the center of the yarn between the balls to knit the first stitch, you will have two fewer ends to weave in later.)

Alternate between strand A and strand B as you knit. After you knit a stitch with strand A, drop the

working strand (strand A) behind the resting strand (strand B). Pick up strand B and knit the next stitch, then drop the working strand (strand B) behind the resting strand (strand A). The strands are always laid over one another in the same direction.

The strands will twist around each other as you twine knit. Take time every so often to remove the extra twist.

Knit on right side and wrong side rows (no purling).



Icelandic Bind-Off: K1, *transfer st from right needle to left needle, insert right needle pwise into first st on left needle, then kwise into front loop of 2nd st, pulling 2nd st through first st but leaving both sts on left needle. Wrap yarn around right needle and knit 2nd st, then drop both sts from left needle; rep from * until all sts have been BO.

SHAWL

Garner Tab

With MC, smaller needle, and using the long-tail method, CO 3 sts.

Knit 6 rows.

Next row (RS) K3, working along selvedge edge, pick up and knit 3 sts (1 st in each garter ridge), then pick up and knit 1 st in each CO st—9 sts total.

Set-up Rows

Row 1 (WS) K3, place marker (pm), [p1, pm] 3 times, k3.

Row 2 (RS; inc row) K3, sl m, M1R, k1, M1L, sl m, k1 (center st), sl m, M1R, k1, M1L, sl m, k3—13 sts.

Row 3 (WS) K3, purl to last 3 sts, k3.

Body Rows

Row 1 (RS; inc row) K3, sl m, M1R, knit to m, M1L, sl m, k1, sl m, M1R, knit to m, M1L, sl m, k3—4 sts inc'd.

Row 2 (WS) K3, purl to last 3 sts, k3.

Rep last 2 rows 57 more times—245 sts; 119 sts between m.

Twined Knitting Section 1

Change to larger needle.

Row 1 (RS; inc row) With strand A (see Stitch Guide), k3, sl m, M1R, twine knit, alternating strand B and strand A, to 1 st before m, k1f&cb (see Stitch Guide), sl m, k1, sl m, k1f&cb, twine knit to m, M1L, drop working strand in front of work, pick up resting strand, sl m, k3—4 sts inc'd.

Row 2 (WS) K3 with working strand, pick up resting strand and twine knit to last m, drop working strand in front of work, pick up resting strand, k3.

Row 3 (RS; inc row) K3 with working strand, sl m, M1R, twine knit to 1 st before m, k1f&cb, sl m, k1, sl m, k1f&cb, twine knit to m, M1L, drop working



Kim keeps detailed notes when creating her own blends so she can re-create them if needed.

strand in front of work, pick up resting strand, sl m, k3—4 sts inc'd.

Row 4 (WS) Rep Row 2.

Rep last 2 rows once more—257 sts; 125 sts between m. Break strand which was not used for last k3.

Stockinette Section

Change to smaller needle.

Row 1 (RS; inc row) K3, sl m, M1R, knit to m, M1L, sl m, k1, sl m, M1R, knit to m, M1L, sl m, k3—4 sts inc'd.

Row 2 (WS) K3, purl to last 3 sts, k3.

Rep Rows 1 and 2 once more—265 sts; 129 sts between m. Break MC.

Eyelet Mesh Section

Change to CC1.

Row 1 (RS; inc row) K3, sl m, M1RP, purl to m, M1LP, sl m, p1, sl m, M1RP, purl to m, M1LP, sl m, k3—269 sts; 131 sts between m.

Row 2 (WS) K3, purl to last 3 sts, k3.

Row 3 (RS) K3, sl m, yo, k1, *yo, k2tog; rep from * to m, yo, sl m, k1, sl m, yo, **ssk, yo; rep from ** to 1 st before m, k1, yo, sl m, k3—4 sts inc'd.

Row 4 (WS) K3, purl to last 3 sts, k3.

Rep last 2 rows 4 more times—289 sts; 141 sts between m. Break CC1.

Transition Rows

Change to MC.

Row 1 (RS) K3, sl m, M1RP, purl to m, M1LP, slm, p1, sl m, M1RP, purl to m, M1LP, sl m, k3—4 sts inc'd.

Row 2 (WS) K3, purl to last 3 sts, k3.

Row 3 (RS) K3, sl m, M1R, knit to m, M1L, sl m, k1, sl m, M1R, knit to m, M1L, sl m, k3—4 sts inc'd.

Row 4 (WS) Rep Row 2.

Break MC.

Next row (RS) With CC2, rep Row 1—301 sts; 147 sts between m.

Next row (WS) With CC2, knit.

Next row (RS) With CC2, rep Row 3—305 sts; 149 sts between m.

Next row (WS) With CC2, knit.

Break CC2. Change to CC3.

Next row (RS) With CC3, rep Row 1—309 sts; 151 sts between m.

Next row (WS) With CC3, rep Row 2.

Twined Knitting Section 2

Change to larger needle.

With CC3, rep first 4 rows of twined knitting section 1—317 sts; 155 sts between m.

With larger needle, RS facing, and using the Icelandic method (see Stitch Guide), BO all sts.

FINISHING

Weave in ends. Wet-block to measurements. ●

Until her family downsized their home in 2017, **Kim McKenna** dyed all her own fleece, roving, and yarn. These days, she uses her blending board to create colors from handpainted indie-dyed braids. Kim teaches spinning and fleece workshops through Coniagas Handspinning and Fleece School, the School of SweetGeorgia, and the Silk Weaving Studio. Kim sends a huge thank-you to Aja Ramsey for her thoughtful suggestions that helped to refine the pattern, for generously sharing her knitting knowledge and skills, and for helping this shawl pattern come to life.



Well-placed garter ridges and a bit of lace finish the border.

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Two indigo-dyed scarves woven with handspun cotton singles. The khadi khanoo shuttle shown is designed to hold a standard book-charkha spindle.

A Primary Palette

from Fresh-Leaf Japanese Indigo

EILEEN HALLMAN

If there is truly a magical dye plant, I think it is Japanese indigo, *Persicaria tinctoria*. Its former name was *Polygonum tinctorium*; it is also known as dyer's knotweed, and although it is in the knotweed family, it is not invasive. These beloved dye plants grow better than the *Indigofera* species in climates that have cooler temperatures. Used fresh, without creating a vat, the leaves can produce blue, pink, lavender, green, and yellow. Of the three primary colors, blue and yellow are easy to get, but the red—a gentle pink—is not easy to isolate. It often appears in combination with blue to produce lavenders to purples.

WHAT IS FRESH-LEAF INDIGO DYEING?

I tell my students that anyone whose mother will allow them to use a blender can do this. The basic technique for robin's-egg blue on silk requires fresh leaves, cold water, a blender, and either a fine strainer or a strainer lined with a straining cloth, plus your fiber. I call this the blue bath. This is a very simple non-vat method requiring fresh leaves. Indigo reduction vat recipes vary around the globe, using different alkalizing and reduction agents as well as fermentation processes with indigo extract, paste, or composted leaves to create color.

After taking a workshop on fresh-leaf indigo dyeing to create robin's-egg blue on silk with Rowland Ricketts III in the fall of 2005 and hearing "it only works on silk," I embarked on a quest to get it to work on cotton. During the workshop, Rowland showed us how to make a vat with the remaining fresh-leaf bath to create the usual indigo blue on cotton. However, I was interested in the simpler non-vat technique.

Rowland also told me about *indirubin*, a chemical found in indigo plants that can create reds, and he recommended a web article from Mukogawa Women's

Indigo Primaries Tool Kit

- Fresh indigo leaves
- Cold water
- Blender
- pH paper
- Lime
- Bowl or vessel
- Vinegar
- Ammonia
- Mordant
- Hot plate

How to Harvest

Harvest your indigo leaves by cutting the stalk above the second node from the ground and stripping the leaves from the cut stems. Cutting above the second node allows the plant to produce new leaves and gives you a second harvest. If it's early in the season, you can also put the cut stems in a jar of water to allow them to root. About a week after harvest, the roots will be long enough for you to plant.



Photo by Eileen Hallman

University (see Resources). I continued my search for information and connected with textile artist and author John Marshall (see page 64), who told me I needed to "just push the pH" to get the blue on cotton when using a fresh-leaf bath.

I planted my first indigo plot in 2006 and was on my way. My experiments started with blue baths, and eventually, I was able to create lavenders and yellows—and now you can, too. I hope you'll plant your own plot of Japanese indigo and give these colors a try.

THE BLUE BATH

When harvesting leaves, you'll need to gather a quantity that is at least twice the weight of your fiber. Fill a blender with leaves and cold water, blend, then strain the juice and allow it to rest for a half hour. (Many recipes call for ice water, but I don't find that to be necessary for small projects.) Add your fiber and swish it around for 5 to 10 minutes, then remove, rinse, and allow to air for about 5 minutes. Place the fiber back in the bath for a deeper color.



Place fresh leaves and cold water in a blender.



Strain the blended leaves, allowing the juice to accumulate in a bowl.



Nubby silk yarn in the blue bath

I find that 30 to 40 grams will dye a 16-gram silk charmeuse scarf a beautiful robin's-egg blue. Depending on the season, that might require leaves from a dozen indigo stalks.

Blue on cotton: Make the blue bath as described above, wait 30 minutes, and add lime to bring the pH up to between 10 and 10.5. (Maybe you've made the 1-2-3 organic vat and are familiar with lime and storing any excess on the bottom of the vat. You do *not* want to do that here; saturation will take the bath up to 11.6 and you will wreck the reaction.) Follow the rest of the instructions above for the blue bath.

INDIGO PINK AND LAVENDER

I could get the pink easily on silk with the information Rowland gave me, but I was obsessed with getting it on cotton. Finally, in 2017, I got it by accident. I was scheduled to demonstrate during an open studio I belong to, and I figured I could work on improving the blue on cotton. I went to the studio and set up, thinking we had lime in our dye cupboard, but we did not—we had soda ash. Thinking it wouldn't make a difference, I used the soda ash instead of my typical lime to get the pH up to 10.

An hour into the process, I was getting a murky green. In frustration, I threw up my hands and went to the party across the hall, thinking I'd discard it when I came back to clean up. An hour and a half later, the whole building could probably hear me shriek when I pulled the fabric out of the bath, rinsed it, and it turned to lavender! That was in early September; the next week, Melanie Wilder, who runs the Fiber Arts Crew at Warren Wilson College, called and said they were ready to do their final Japanese indigo harvest. Did I have any experiments I wanted to run? Of course!

We harvested and made four baths, each with a different alkali. We used lye, lime, soda ash, and ammonia. On that date, the lye and lime gave blue, and the soda ash and ammonia gave lavender. Since then, I have sometimes gotten lavender with lime and blue with soda ash. I prefer lime instead of lye for blue and ammonia for indirubin lavenders and pinks.

Photos by Eileen Hallman

Lavender on cotton or silk: Make the blue bath as above, wait 30 minutes, and then add ammonia; this time, bring the pH up to between 10 and 10.5. This bath also works on silk; go for the lower pH and rinse in a vinegar solution.

INDIGO YELLOW

Now for yellow. As a dyer, I have often left goods in a dyebath overnight. The first time I tried it with the blue bath on silk, I was shocked in the morning to pull out a pale green piece. I thought maybe it was chlorophyll, so I went to the grocery store and bought some chlorophyll remover. I also looked up some remedies online. Nothing worked, so my pale-green cloth remained a puzzlement for a few years.

In reading dye books, especially those on indigo, I saw “indigo yellow” mentioned. With further research, I learned that it is the dyestuff *kaempferol*,



The colors of Japanese indigo: yellow, greens, and blue from one bath and purples/lavenders from a different bath.

Photo by Eileen Hallman

which is also found in Canadian goldenrod, ginkgo leaves, and rabbitbrush. I figure cold water is used to suppress the activity of the yellow, but I don't know that for certain. To get yellow, though, you do need a mordant. Some yellow is taken up on silk without a



Fresh-leaf indigo can create a spectrum of colors on cotton and silk.

mordant, but it will probably wash out in time. Also, kaempferol is not lightfast.

To get the yellow on either cotton or silk, you will need to mordant your fiber. I use either aluminum acetate or Liles's Alum #1 (see Resources) for cotton, which is a neutral aluminum sulfate mordant. Either of these mordants can be used on cotton and silk. Aluminum sulfate is easily located at a garden store, and my hardware store carries it. An easy alternative is to use Dye-Lishus cotton (see sidebar on the following page), which has been treated to accept dye and behaves as if it's been mordanted.

The recipe options for yellow are numerous, and you need heat but not any extra chemicals for the bath itself, only chemicals for mordanting the fiber. Here are two ways to create more than one color from a single blue bath.

Yellow on cotton and blue on silk: Mordant the cotton and put it in the blue bath immediately. The cotton will not interfere with the blue reaction or take up any blue. After the half-hour resting period, you can enter your silk. You can leave the cotton in as long as you like. What you will get is yellow cotton and blue silk.

To increase the intensity of the yellow, you can heat the bath after removing the silk.

Four colors from one bath on silk: Prepare four pieces of silk, three mordanted and one unmordanted. Label the unmordanted piece Blue, and the other three Teal, Green, and Yellow. Make the blue bath, wait 30 minutes, then enter the Blue, Teal, and Green pieces. Swish them around for 5 to 10 minutes, remove the Blue silk, rinse, shake and air out, and hang to dry.

Next, put your bath in a pot and heat slowly. When the temperature reaches 80 degrees Fahrenheit (26.7 degrees Celsius), remove the Teal. Turn the heat up; when the pot reaches anywhere between 120 and 140 degrees Fahrenheit (49 to 60 degrees Celsius), remove Green. The green will change with increasing temperature as more yellow is taken up in the fiber. Take it out when you like the color. Now take the temperature up to 180 degrees (82 degrees Celsius), turn the heat off, and allow the bath to settle; this may take an hour. When there is clear yellow liquid above sediment in the bath, add the last mordanted piece to get just yellow. (You can boil it to get gold, but I like the yellow.)



Indigo-dyed scarf on the loom



Fresh-leaf indigo-dyed cotton sliver and yarns

Photos by Eileen Hallman

HOW DOES IT WORK?

The chemistry of color is complex, but a short summary of what is happening in these fresh-leaf indigo baths is useful. The indigo leaf that begins the process contains a color precursor and an enzyme. When the leaf is crushed, the precursor *indican* and the enzyme combine to produce *indoxyl*. Indoxyl can become

What is Dye-Lishus Cotton?

Dye-Lishus, a registered trademark of New World Textiles, LLC, is undyed cotton that has been pre-treated to attract and hold dyes without the use of extra chemicals. The cellulose structure of the fiber has been changed so that it behaves as if scoured and mordanted. Dye-Lishus slivers, yarns, and fabrics work with any type of dye—acid dyes, natural dyes, fiber-reactive dyes, and more.



Photo by Eileen Hallman

either indigo (the default) or indirubin (needs intervention). Yellow kaempferol exists in the leaf and has little or no effect on the blue or pink production. Kaempferol strikes slowly at low temperature; blue production ceases above 140 degrees Fahrenheit (60 degrees Celsius) and above pH 10.5.

THE SAMPLES

You can choose the point at which you dye the fiber: dye first; spin first and then dye; or spin, weave, or knit then dye. For the woven samples shown here, I chose to dye a commercially spun yarn for the warp and dyed fiber that I would then spin for the weft. As in most of my work, I spin cotton on the charkha and weave with my handspun singles as weft using a shuttle I developed for that express purpose. Because two of the colors I wanted to dye required mordanting, I used Dye-Lishus cotton sliver, simply washing it and dunking it in the dyebath.

My original plan was to weave handspun cotton on a silk warp, but I wove it on a cotton warp instead. The colors on silk are so bright that I did another smaller piece in silk. I mordanted and dyed the silk roving, thinking it would be as easy as the cotton to spin, but it was not. My “note to self” after the silk sample is to spin first, dye later. There’s always more to explore. ●

Resources

John Marshall: Works in Fabric, johnmarshall.to.
Liles, J. N. *The Art and Craft of Natural Dyeing: Traditional Recipes for Modern Use*. Knoxville: University of Tennessee Press, 1990.
Mukogawa Women’s University, “Dyeing Purple from Fresh Leaves of *Polygonum tinctorium*.” mukogawa-u.ac.jp/~ushida/e_purple.htm.
New World Textiles, newworldtextiles.com.
Ricketts Indigo, rickettsindigo.com.

Eileen Hallman has been spinning cotton on the charkha for over 35 years, weaving with her handspun singles for at least 30, and dyeing cotton with natural dyes and teaching all of the above internationally for more than 20. As the owner of New World Textiles, she offers fiber and yarn to spinners, dyers, and weavers and introduces products and techniques that support sustainability.



Indigo-dyed samples hang in the California sun.

Photos courtesy of John Marshall

Singing the Blues

Indigo Colorfastness

JOHN MARSHALL

*Noted dyer and weaver John Marshall kindly allowed us to share an excerpt with you from his book *Singing the Blues* (2018, Saint Titus Press). This self-published work is based on his translations of Japanese indigo recipes using *Persicaria tinctoria* and his experiences as an indigo dyer, researcher, and instructor. For more information about the book, see page 67. — Editor*

From time-to-time the question of colorfastness comes up regarding natural dyes and fresh-leaf indigo, in particular. With the exception of mineral-based natural dyes, such as iron oxide and soymilk, all dyes, including synthetic dyes, will fade with prolonged exposure to ultraviolet light. The question is always, “How much fading is acceptable?”

I decided to conduct an experiment to find out just

how much the colors produced from the recipes in this book will fade. I contacted a number of friends around the country—some are experienced in natural dyes; others have scientific backgrounds; others are artists. All of them had their own unique skills to bring to the group.

We started by sharing the same seed stock from my garden to remove one variable. The same recipes were sent to each participant, along with the same woven samples prepared in the same manner—again this was done to remove the number of variables affecting our results. What I couldn’t control were the unique working conditions of each member of the group.

Once the participants finished dyeing the assigned dye samples, they mailed them back to me. I cut each piece into thirds. One portion, as a control in our experiment, was tucked away in a dark place to protect it from

light. The second piece was given a coat of soymilk, and the third was left alone. Each piece was labeled with the dyer's initials, the fiber content, the recipe used, and whether or not it received a coating of soymilk.

Each sample was clipped to a rack and hung outdoors with full exposure to our California sun for three months. They were exposed not only to sun, but sprinklers, birds, and insects. That is likely to be far more abuse than you would give any textiles you have spent so much precious time in creating—but I wanted to see what would happen.

As mentioned above, many variables came into play even though we all used the same seed stock and recipes. In addition to the local water source and growing conditions, the actual pH achieved for the vat dyes was probably different for each participant, as well as how long each sample was allowed to soak in contact with the dye, whether the yardage was unbleached or natural, and probably other details I haven't considered.

Photographing the samples to present to you also posed a problem. I've made every effort to color correct the images you see here on my screen, but the inks used by the printer will introduce one more change. Consider all these details as you reach your own conclusions

regarding the desirability of any given color achieved.

While the purpose of the experiment was to test for colorfastness in fresh-leaf indigo-dyed fibers, I thought it might also be interesting to see how these compare to fabrics prepared with other dyes, or indigo from other regions of the world. I tested fabrics dyed with natural indigo from India, Guatemala, and Japan—they all fared about the same. I also included synthetic dyes on synthetic fibers, and synthetic dyes on natural fibers. And as one more point of comparison, I included other natural dyes on natural fibers. These, too, faded at about the same rate as the fresh-leaf indigo-dyed pieces, and so I also decided not to show them in the chart.

BACK TO THE EARLIER QUESTION: "HOW MUCH FADING IS ACCEPTABLE?"

The answer is truly up to you. All dyes fade with prolonged exposure to direct sunlight. That's a given. Intuition tells us that even a little protection from UV rays makes a big difference, as the experiment presented here helps to prove. Keeping the finished textiles stored in a closet or box when not in use will certainly prolong their life—this applies as much to natural fibers as it does to natural dyes.



This sample is a synthetic navy blue dye on silk *chirimen*. It was suspended on the rack by one corner, as shown on the previous page. You can see how dark the section under the clothespin remained. No soymilk was applied. Notice the gradations in color. The palest section had full exposure to the sun. The darkest section was curled into the center. This brings up the point that I found with all the samples, even the sheer ones: any protection at all greatly reduced the fading of the colors.

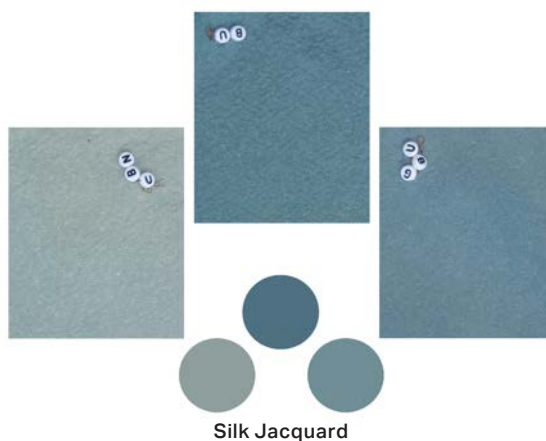
Below are color swatches to show the results of our group's efforts. If for some reason there was a range of results for the same fiber using the same recipe but from different regions, then I have included a sample of only the extremes.

The squares are photos of the actual samples. The circles are an average of the shades found in each sample. The sample in the center of each grouping is the control—to the right is the sample treated with soymilk, and to the left is the untreated sample.

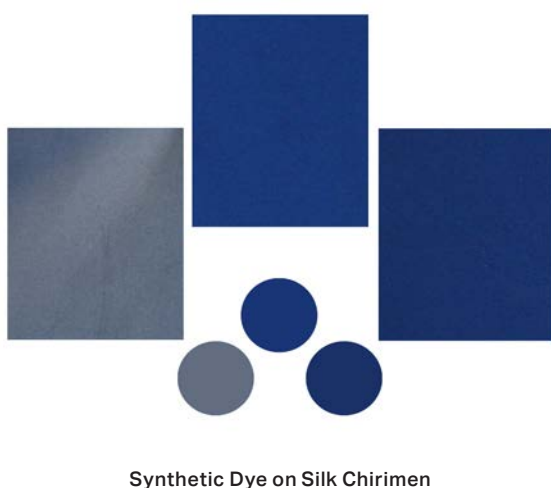
Simply Raw Leaves, Water, Fiber



Cooked Raw Leaf and Enzyme Vat

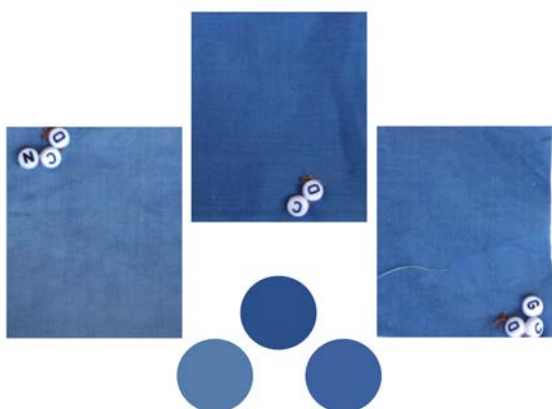


Miscellaneous



Editor's note: More color swatches and results are included in the book.

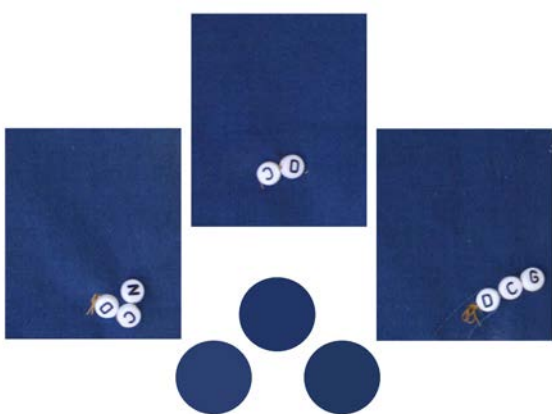
Dyeing with Dry Indigo Leaves



Ramie



Cannabis



Wool

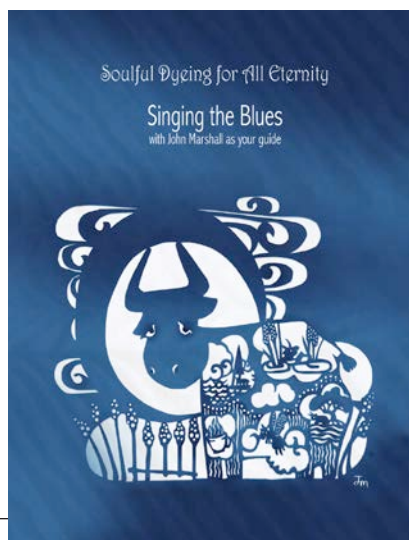
I have advocated the use of soymilk since the early 1970s. It's cheap, easy to make, and totally nontoxic. It does have its limitations, though. As you can see from the tests on the previous page, it does make a significant difference in how quickly and to what degree the dye will fade. It slows down the process; it doesn't prevent it. I should mention at this point that a layer of soymilk applied to your finished piece will help to prevent wrinkling and cut down on soilage.

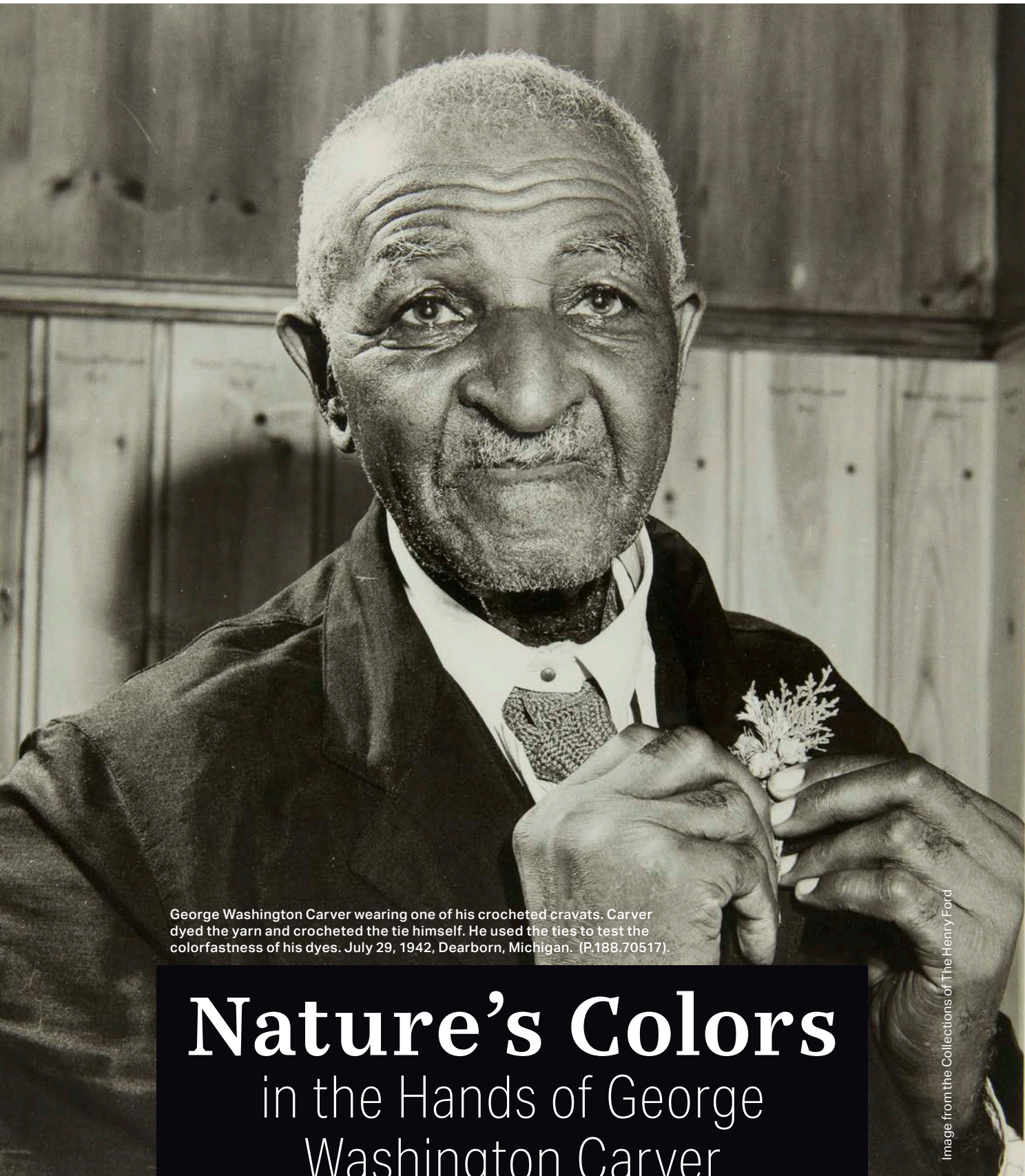
My feeling is that unless you're producing upholstered lawn furniture, it isn't an issue. I produce high-quality dyed textiles, and I want to give my customers the best I can produce. To maintain that high quality requires some effort by the new owners—caring for their investments. The clothing I produce is geared toward elegant day and evening wear. A few hours of standing in the sun during a summer wedding reception will do more harm to the mother-of-the-bride than it will harm the fresh-leaf indigo-dyed tunic she has chosen to show off. The colors offered by this unique process and the delight it brings my customers, as well as the joy I take in working with them, more than offset the somewhat limited lifespan of the colors achieved—just keep in mind, all colors fade. ●

Singing the Blues

John Marshall

2021, Saint Titus Press, johnmarshall.to





George Washington Carver wearing one of his crocheted cravats. Carver dyed the yarn and crocheted the tie himself. He used the ties to test the colorfastness of his dyes. July 29, 1942, Dearborn, Michigan. (P.188.70517).

Nature's Colors

in the Hands of George
Washington Carver

NANCY NEHRING

Image from the Collections of The Henry Ford

George Washington Carver (about 1864–1943), the famous African American agronomist from Tuskegee Institute (now Tuskegee University), spent his career working to improve the lives of poor Southern farmers. But as a young man, Carver envisioned himself becoming a professional fine art painter and enrolled in college as an art major in 1890. Although he went on to pursue a life in the sciences, Carver’s artistic talents rippled throughout his lifetime of work.

One of his many avenues of research was in creating new and improved dyes from locally available plant materials. Carver had experience with natural dyes early in life and sought to develop methods that would allow poor farm families to increase the value of farm crafts. This facet of his work was part of a much larger rural outreach program at Tuskegee. Having begun his life on a successful Missouri farm, Carver understood the importance of integrating creative household economy, such as dyeing, crochet, and embroidery, with useful new crops and sustainable agricultural methods.

BEGINNINGS

George Washington Carver was born near the end of the Civil War to Mary, an enslaved woman, on a farm near Diamond Grove, Missouri.¹ The 240-acre farm settled by Moses and Susan Carver is now the site of the George Washington Carver National Monument. George only lived on the Carver farm until he was eleven years old, but it was there that his lifelong interests in science, nature, art, and craft were born. As he stated in a 1931 letter to Isabelle Coleman, “If I had leisure time from roaming the woods and fields, I put it in knitting, crocheting, and other forms of fancy work.”²

The Carvers lived a nearly self-sustaining and frugal lifestyle. They lived in a basic one-room log cabin and produced all of their own food except sugar and coffee. Textiles were made from linen, hemp, and wool, all grown on the farm. (The Carvers lived outside of the cotton-growing region of Missouri.) Nothing was ever thrown away.

Color fascinated George from an early age. He became aware of its artistic possibilities when he saw his

first paintings: family portraits hanging in a neighbor’s house. After having someone explain to him how a painting was made, “he made colors out of pokeberries, roots, and bark and painted on cans, wooden pails, pieces of glass, anything.”³

He likely got ideas for creating his colors by helping Susan make dyebaths for textiles that were produced on the Carver farm. George, a keen collector of specimens at an early age, must have delighted in gathering dye plants and creating dyebaths. He loved nature, spending much of his free time outdoors. He even had his own secret garden in the woods where he collected some of his favorite plants. Searching out dye plants with Susan, preparing fibers and plants for extraction, and watching the multitude of colors created had a lasting impact on him.



Photo by Nancy Nehring. Image courtesy of National Park Service, Tuskegee Institute National Historic Site, George W. Carver Museum

Detail of a round burlap doily used as a model in Carver’s agricultural extension work.



Coiled mat made from dyed cotton-stalk fiber. Label with Carver's signature reads, "Cotton stalk fibers. G. W. Carver - 1929." From the collection of George Washington Carver National Monument.

Photo by Curtis Gregory

George began his formal education at home. He recalls in a 1922 letter, "Mr. and Mrs. Carver taught me to read, spell and write just a little"⁴ using a *Blue Back Speller*,⁵ which was the only book in the Carver home. "From a child I had an inordinate desire for knowledge, and especially for music, painting, flowers and the sciences. . . . Mr. and Mrs. Carver were very kind to me and I thank them so much for my home training. They encouraged me to secure knowledge helping me all they could, but this was quite limited. As we lived in the country no colored schools were available so I was permitted to go 8 miles to a school at town (Neosho)."⁶ By 1896, he had a master's degree from Iowa Agricultural College (now Iowa State University) and had accepted a position as head of the agronomy department at Tuskegee Institute.

Although not one of his primary research focuses, Carver worked with natural dyes on a number

of projects throughout his scientific career. These ranged from the simplest dye preparations that he had learned from Susan to ones involving sophisticated chemistry.

RURAL OUTREACH

From the beginning of his career at Tuskegee, Carver conducted an agricultural outreach program designed to improve the crops and living conditions of poor Black sharecroppers and tenant farmers.⁷ Having a broad view of a successful farm from his childhood, he chose to include domestic topics such as vegetable gardening, nutrition education, household sanitation, and sick care.

Remembering his frugal upbringing, he included handicrafts that could be made from agricultural waste and found plant materials. These useful and beautiful objects could be sold to supplement the family income or used to brighten a family home. Examples of these handicrafts include coiled mats and embroidered burlap doilies.

To increase appeal, he dyed the humble materials with natural dyes from local plants, just as he had learned from Susan. Carver dyed banana leaves and stalks from cotton, okra, and wisteria for coiled mats. For doilies, he created ground cloth for stitching and fancy edgings from worn-out burlap bags used for tobacco shipping. Often, usable material could be salvaged between holes and rips. Sometimes he dyed the burlap, and at least one extant doily remains that appears to have been dyed with black walnuts before the embroidered embellishments were added. Burlap bags as well as feed and flour sacks were stitched together with cotton string. The string could be saved and dyed in various colors for the embroidery and fancy edgings worked in crochet.

In his laboratory, Carver pursued multiple areas of research involving dyes. Apparently, Carver did not keep a laboratory notebook. It is reported that Robert Lee Vann of Pittsburgh once asked him if he had notes about his laboratory procedures and formulas. Carver responded with a smile that he had many formulas but had not yet written them down. Apparently "yet" never came, as there are no known records of Carver's dye formulas that have been found to date.

Even without notebooks, we can follow his work through other documents and the context of the social and political forces that guided his work.

PEANUTS, PURPLES, AND THE IMPORTANCE OF DYES

One of the primary focuses of Carver's research was on crop rotation. He advocated for cotton/legume rotation rather than continuous cotton growing. Cotton can severely deplete the soil, while legumes can improve soil health in a number of ways. To support his efforts in promoting rotation to Southern farmers, Carver worked to find new commercial uses for legumes that would make those crops more valuable.

He became famous for his work with peanuts, claiming that over three hundred products could be

made from this useful legume. In the course of his research, Carver produced 30 textile dyes from peanut skins. (He produced another 30 or more from sweet potato skins.) But more interesting might be the discovery of quinine in roasted peanut skins, connecting peanuts to one of the most famous dyes in history.

Quinine was important for treating symptoms of malaria. It was also associated with the first aniline dyes. In 1856, William Perkin created the aniline dye that would later be known as mauve while trying to synthesize quinine using petrochemical feedstock. Additional research on Perkin's part revealed several chemicals closely related to mauve and quinine that also produced useful dyes. By World War I, German manufacturers controlled an aniline dye market that produced 75 percent of the world's dyes.

What Dyestuffs Did He Use?

George Washington Carver did not leave detailed notes regarding much of his dye research. In a 2014 article published in the Textile Society of America Symposium Proceedings, Eulanda A. Sanders and Chanmi Hwang cite that Carver is known to have created dyes and pigments from 28 different plants.¹⁰ The list includes familiar dye plants, such as dandelion, onion, pomegranate, and osage orange. He also developed ways to produce grays, lavender, and deep orange using sweet potato peels and vines. From peanut plants, he created intense brown, gray, lavender, slate, and pale canary.

George Washington Carver holding Queen Anne's lace flowers, Greenfield Village, Michigan, 1942. Image from the collections of The Henry Ford.



During the First World War, Germany ceased production of aniline dyes. Imports of these increasingly important chemicals into the United States began declining in 1914 and ceased altogether in 1916. Industries relying on dyes for printing, paint, papermaking, textiles, and leather were running short. Lacking capacity and chemicals for making aniline dyes in the United States, industry had to rely on natural dyes to fill the gap. The US government asked for Carver's help.

Carver searched the countryside for additional dye plants and located 28 plants from which he created 536 colorfast textile dyes.⁸ But Carver knew that there were insufficient quantities of hedgerow plants for industrial use and that these natural dyes were often considered inferior to aniline dyes. We know from various sources that he was researching ways to make natural dyes more permanent. Although not specifically mentioned by Carver, it is interesting to note that creating aniline dyes using plants such as peanut skins as feedstock in the chemical process might be one way to improve colorfastness.

In addition, a source of ammonium nitrate was needed to make aniline dyes. Ammonium nitrate was critical to the war effort as a key component in the manufacture of munitions, fertilizers, and dyes. The United States had been importing nitrate minerals from South America, but Germany set up a blockade, so the US government constructed a nitrogen plant⁹ to make ammonium nitrate from nitrogen in the air.

This is the third and final article in a series on the life and textile work of George Washington Carver by Nancy Nehring. To learn more, visit pieceworkmagazine.com.

"George Washington Carver: A Lifetime of Crochet" and instructions for four crochet swatches made by Carver in *PieceWork*, Spring 2021.

"Textiles in George Washington Carver's Agricultural Extension Program" and instructions for re-creating one of Carver's embroidered burlap doilies in *PieceWork*, Winter 2021.

A test run produced the first ammonium nitrate on November 25, 1918. Because Carver was interested in ammonium nitrate for both fertilizer and dyes, he was sent samples to begin experimenting with. However, with the end of the war, the plant ceased operation in January 1919. With no materials forthcoming, Carver turned his attention to other projects.

George Washington Carver was filled with curiosity about the natural world. As he followed this curiosity where it led, he laid groundwork in many fields for generations of future scientists. We might not have Carver's dye recipes today, but we can carry his curiosity forward and look to nature for color. ●

Notes

1. For a discussion of slavery in southwest Missouri, see Diane L. Krahe and Theodore Catton, *Walking in Credence: An Administrative History of George Washington Carver National Monument* (National Park Service, 2014), 21–23.
2. Rackham Holt, *George Washington Carver: An American Biography* (New York City: Doubleday, 1950), 9–10.
3. Holt, *George Washington Carver: An American Biography*, 14.
4. Gary Kremer, ed., *George Washington Carver: In His Own Words* (Columbia: University of Missouri Press, 1987), 50.
5. Also known as *A Grammatical Institute of the English Language, Vol. 1* and later, *The American Spelling Book* by Noah Webster.
6. Kremer, *George Washington Carver: In His Own Words*, 20.
7. The program was a success and became a model for the land-grant colleges' Agricultural Extension Programs.
8. Holt, *George Washington Carver: An American Biography*, 236–237.
9. United States Nitrate Plant No. 2 at Muscle Shoals, Alabama.
10. Eulanda A. Sanders and Chanmi Hwang, "George Washington Carver: Textile Artist," *Textile Society of America Symposium Proceedings* (2014): 911.

Like Carver, **Nancy Nehring** is both a textile enthusiast and a scientist (she is a chemist; he was a botanist). Both attended Iowa State University. Nancy is known for her historical needlework and crochet research and is the author of several books covering a wide range of textile crafts.

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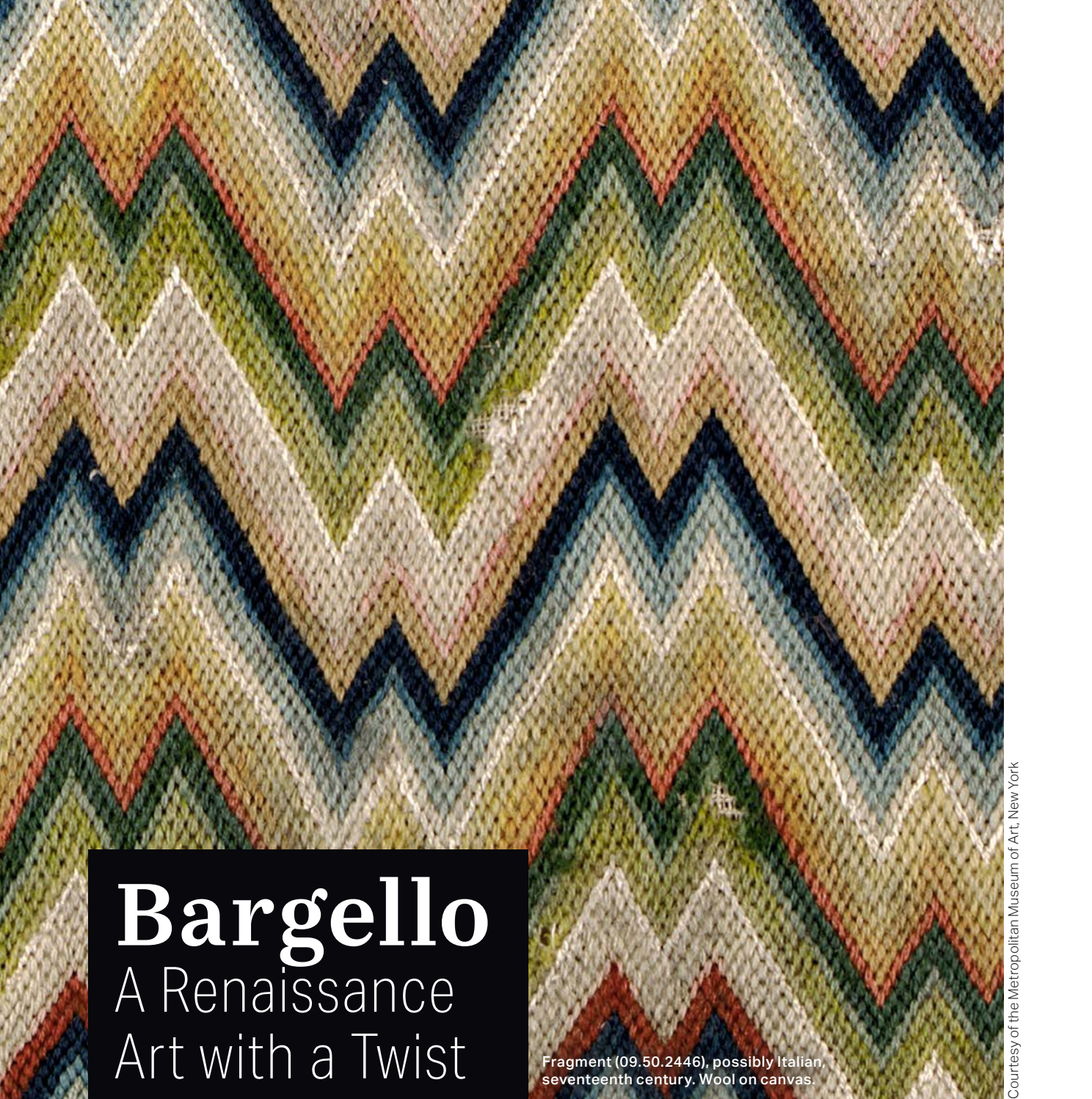
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Courtesy of the Metropolitan Museum of Art, New York

Bargello

A Renaissance Art with a Twist

LINDA M. PERRY

Fragment (09.50.2446), possibly Italian, seventeenth century. Wool on canvas.

Hail to the handspINNERS and their power to create unique, formidable yarn. As a spinner, albeit a very novice one, I always coveted handspun yarns for their beauty and was amazed at the handspun I saw knitted and crocheted into beautiful garments. But my understanding of handspun expanded when *Spin Off* editor Kate Larson suggested that I try handspun yarn in a form of needlepoint that I have practiced over the years—bargello.

Kate and I had been working on an article and project focusing on historic bargello for *PieceWork* using traditional Persian wool yarns. We hatched a plan to explore my beloved bargello with handspun, trying different stitches and gauges. I have always been a strong advocate and committed user of fine Persian wool yarns. These yarns are crisp and tightly twisted—what I refer to as “hard” yarns. Understanding the yarn and spinning the

yarn for this style of needlepoint opens up a whole new world of pattern.

In a whirl of ideas, I developed a series of patterns and designs. I was ready to experiment to see what kind of creative results this new wave of thinking might offer. Fortunately, I own a shop, Harbor Yarns, across the hall from an eclectic shop that stocks a plethora of locally spun gems. The quest began as I grazed the inventory. I am pleased to share with you my results.

WHAT IS BARGELLO?

Bargello is a form of needlepoint embroidery. The signature of this technique is the upright, vertical stitching. Motifs are created through repeated sequences of stitches, creating geometric and symmetrical patterns. Typical pattern configurations are zigzags, ogees, waves, crescents, and other abstract designs. The artful use of yarn colorations and shadings delineates the individual rows. Typically, analogous color schemes arranged from light to dark are the classic choices.

A few years ago, I made it my mission to research and try to revive the technique. As an avid knitter, I found my hands and wrists were getting worse for the

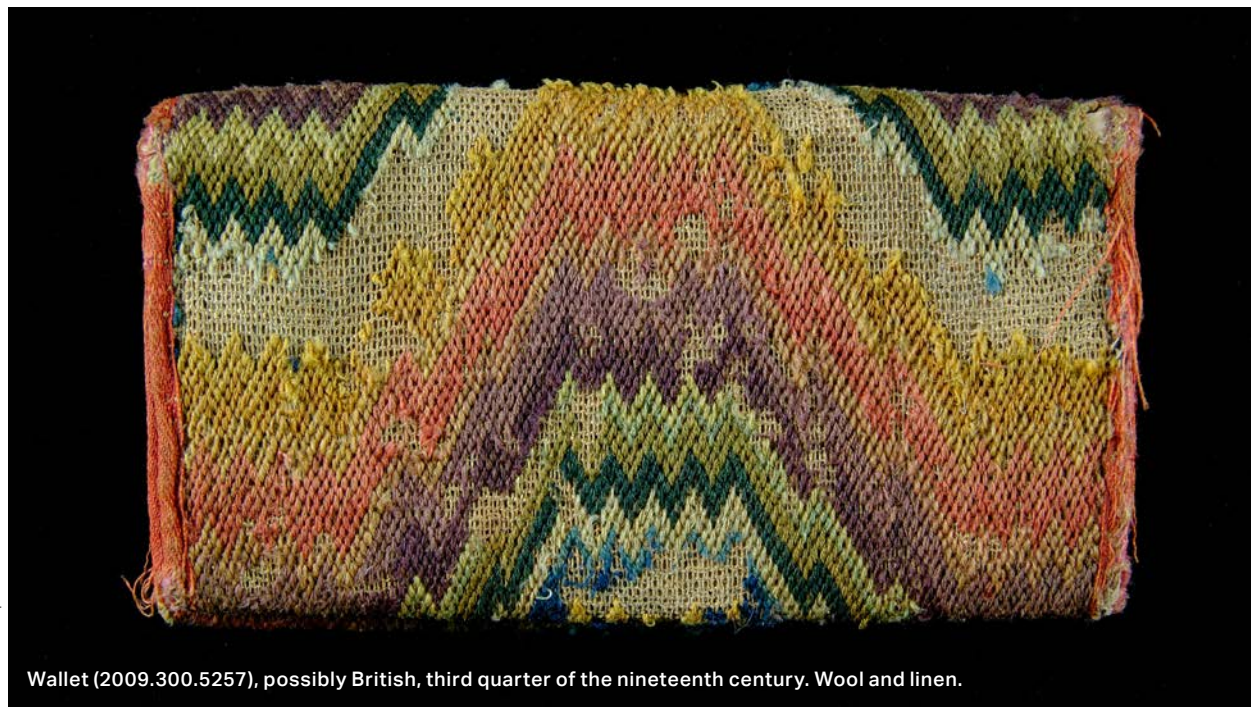
wear and needed a change in finger action. Bargello seemed like a good remedy. I could still play with color, experience the therapeutic effects of moving the needle, and shop for a yarn stash. This was a great antidote.

I practiced many traditional needlepoint patterns and experimented with some contemporary, more modern styling. I was hooked and eventually published *Back to Bargello* (see page 83).

The beauty of bargello not only lies in visual satisfaction of symmetry and color harmony, but it is also very easy to learn. There are abundant pattern possibilities, and if you're a lover of color, there are endless opportunities to experiment with design and palette whether you are a beginning or advanced stitcher.

A BIT OF BARGELLO HISTORY

Some of us are of age to remember the bargello needlework trend of the 1960s and 1970s. Think iconic flame stitch. It was fairly short-lived and remains somewhat of a lost art. As with many types of needlework, pinpointing historic origins is a challenge, including verifying specific dates, geographic locations, and makers. Often, this is due to translation and the unique technical styles of Indigenous embroiderers across various countries.



Wallet (2009.300.5257), possibly British, third quarter of the nineteenth century. Wool and linen.

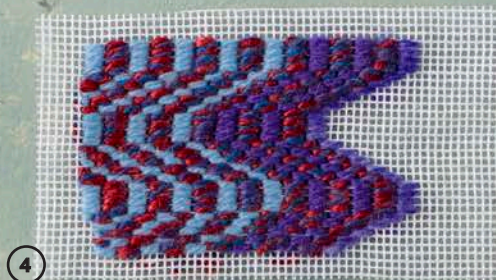
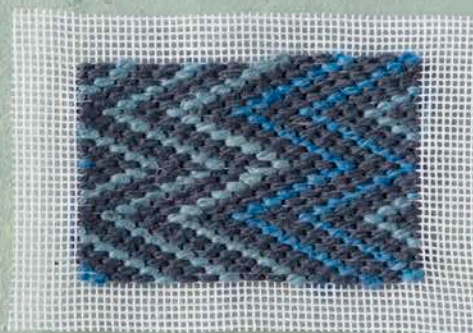
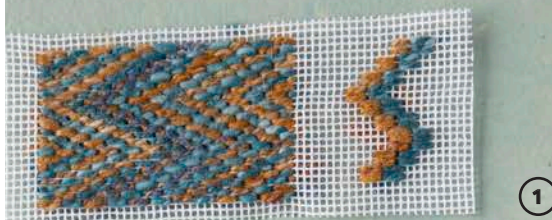
The term bargello occurs in a number of languages and time periods. “Florentine work” is also commonly associated with this technique, as the origins are thought to be from Florence, Italy. “Hungarian point” (*punto unghero*) is based on the belief that bargello began in Hungary, and “flame stitch” (*punto fiamma*) is probably the best known of all the stitches, using zigzags that resemble flames. In the United States, we commonly use the term bargello to encompass this needlework form.

The popularity of needlework throughout Europe points to the origins of canvas embroidery in around the fourteenth to fifteenth centuries. This was highlighted by the Renaissance influence and ties to the Medici reign in Florence, Italy. It was an established needlework art form by the fifteenth century.

Fabrics and yarns used in bargello have evolved throughout time. Early centuries saw coarse fabric backings and wool yarn for stitching. The sixteenth century ushered in a golden age of artistic flair in pattern variations. At that time, the refinement and availability of steel needles was leaving its mark on needlework in Europe. Fine, colorful silk threads became popular. France promoted bargello, and French tapestries and fabric trends were copied in embroidery stitching. Such was the case with a taffeta material of the 1500s, also known as “Florentine.” The jagged “water-marked” edges of the silk taffeta were copied in the stitchery motifs, leading to the prevalence of shading gradations that were common in more modern times.

Furniture pieces have been hallmarks of bargello trends. Upholstery pieces have lasted throughout the centuries, worked in colorful, hardwearing wool yarns on a coarse woven background. The expansion of trade throughout Europe promoted demands for needlework everywhere.

Around the eighteenth century, the British pursued a liking for French textile influences, and thus the popularity of bargello continued. North America eventually caught on to the trend in the 1830s to 1870s. Translations of bargello needlepoint went into such practical items as rugs, bed canopies (for warmth in the homestead), wallets, pocketbooks, needle cases, and samplers.



1. Flame Stitch (variegated handspun) Using a randomly variegated handspun yarn to cover the stitching area gives an all-over visual explosion of color. This sample shows one randomly colored handspun used throughout.

2. Little Wavy Pattern (colorplay) This sample was an experiment in which I plied solid and variegated colors together, creating a marled effect. Three solid-colored yarn rows alternate between the handspun.

3. Flame Stitch (alternating with multiple solid rows) To change up the flow of the flame-stitch pattern, there are two solid yarn rows to one handspun row. Various proportions of solid to variegated can make for an interesting overall design effect.

4. Modified Flame Stitch (alternating rows) A handspun, randomly variegated yarn with alternating rows of light blue and purple contrasting solid yarns.

5



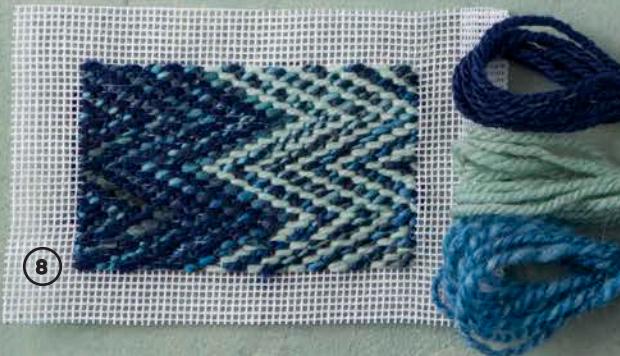
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7



8



5. Little Wavy Pattern (analogous)

Variations of analogous colors are used in the solid rows.

6. Geometric Diamond Pattern (kiss of color) I enjoy trying color surprises, especially in the more graphic, contemporary bargello patterns. Often, I place a “kiss of color” as an accent. Depending on the size of the project, it can be in a single spot or, on larger areas, intermittently dispersed for a visual story.

7. Little Wavy Pattern (contrasting colors) The handspun yarn in this sample (yellow) has very subtle color flecks. It is more of a heather yarn as opposed to the defined variegated yarn used in previous samples. This pattern has a more contemporary look, so I thought a nice color contrast of solid navy would create a funky visual stripe effect.

8. Flame Stitch (alternating solid rows) This sample shows the use of lighter or darker solid yarn between variegated handspun. Both can delineate the pattern effectively but differently. You can see how the lighter color makes the handspun pop, and the darker solid tends to give a blending effect.

MATERIALS AND TECHNIQUES

Mesh canvas is the foundation of the bargello stitch. The uniform squares for traditional needlepoint are categorized by the number of holes per inch. Mesh size can range from heavy (#3) to very fine (#40). For handspun yarns, expand your thinking to other options such as rug canvas or other stable fabrics with low thread count. Look for a base with a visible grid that is large enough for your yarn to pass through easily.

Tapestry needles with round, blunt ends and elongated eyes are used in bargello. Sizes range from small (#26) to large (#13). The important thing is for your yarn to glide easily through the eye and then smoothly through the mesh. For thicker handspun yarns (worsted weight and even chunky), a standard yarn needle works well.

Modern millspun needlepoint yarns (often referred to as Persian yarn—100% wool) are used for bargello because they provide good coverage, preventing the mesh canvas from showing through the work. These yarns have a firm twist so they are durable. Typically, several plied yarns are loosely twisted, with each plied yarn referred to as a “ply” by many needleworkers. Two “plies” are ideal for normal mesh ranges.



9. Flame Stitch (bulky yarn)

This two-ply handspun yarn was a challenge. The “almost roving” fibers with a lot of color excitement called for a rug hooking mesh base. I spray-painted the mesh first because the beige mesh tended to show through the stitching. I alternated a double strand of a solid-color handspun yarn. The overall effect is quite kaleidoscopic. A sample like this could be used for a fantastic wall hanging near your spinning wheel to show off your beautiful yarns.



Courtesy of Cooper Hewitt, Smithsonian Design Museum Collection

Bag (1962-23-6), Mexico, nineteenth century. Wool and beads.

For handspinners, the norms can go out the window. We can get creative with ply structure, gauge, and fiber choices. The project's end use will determine what characteristics your yarn should have. Yarns with coarser fibers and firmer twist create a more durable textile, while finer fibers and nontraditional yarn structures might feed your creative explorations.

Here are some yarn guidelines that will help you avoid disappointment and stressed hands as you explore:

- The yarn must flow through the holes in the mesh canvas easily, otherwise it will wear out your fingers and the yarn, not to mention your patience. There are different sizes of mesh, so you can adjust the yarn weight and surface texture accordingly.
- You must be able to thread the yarn into a tapestry or yarn needle. I've done some makeshift "needles" to accommodate thicker yarns—bobby pins and even a turkey lacing needle.
- Choose yarns that don't kink or have a predisposition for knotting. Yarns that fray easily when cut into short lengths can also be challenging.
- Yarns with some variation in gauge (thick and thin)

are fine, but extreme variations in gauge might lead to the canvas showing through the work.

Basic Stitching and Finishing

Bargello stitching is vertically oriented—straight up and down stitches that cover two or more canvas threads. The difference between the top of one stitch and the top of another is called a step. A notation such as 4:2 means four mesh holes in height with a two-hole step. You can clearly see this arrangement on bargello charts. One main pattern line of stitches is first established and then repeated sequentially throughout. Every row following the foundation row is the same stitch sequence.

Once the canvas has been filled, it can be blocked to preserve its original shape. Either apply steam to the back side of the piece or roll it in a wet towel for a few hours, then lay it out on a blocking mat or somewhere you can secure pins around the perimeter for the desired shape.

LINDA'S BARGELLO SKETCHES

These are just a few examples to guide you in some creative ways to work with handspun yarns. Most of these samples focus on exploring color. Variegated handspun yarns can be used in many ways. I explored the use of solid-colored rows organized to subdue or punctuate variegated handspun in my samples here. I hope this inspires you to grab some canvas and try stitching your own handspun! ●

Resources

- Phelan, Dorothy. *Florentine Canvaswork*. London: B. T. Batsford, 1991.
- Spencer, Eleanor. "History of Needlepoint." *McCall's Needlepoint*, Book 2, edited by Eleanor Spencer. New York: McCall Pattern Co., 1971.
- Williams, Elsa S. *Bargello: Florentine Canvas Work*. New York: Van Nostrand Reinhold, 1967.

Linda M. Perry has degrees in textiles and apparel design and had a long career teaching in higher education. She currently lives on a small island in Midcoast Maine and owns and operates a yarn shop in Damariscotta, Maine. She sells her own line of hand-dyed yarns, specializing in indigo. Her book, *Back to Bargello*, was the result of her love for needlework and desire to revive bargello stitchery. Learn more at harboryarns.com.

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Get stitching! This rigid spindle bag is created with hand-stitched bargello—perfect for a spinner on the go.

Photos by Matt Graves

Bargello Spindle Bag

LINDA M. PERRY

There are many fun and practical end products one can make with bargello needlepoint—pillows, chair seats, purses, book covers, pincushions—but the perfect project for the handspinner is a tote for a drop spindle. I also use it as a knitting bag; it stands upright and corrals my ball of yarn as I knit.

This project gives you the opportunity to play with color and pattern using a small amount of precious handspun. Spin new yarns and carefully plan your palette or let loose using a pile of leftover yarns. Sampling can be great fun using small swatches of mesh canvas, and the stitching doesn't take up much time or precious yarn. You can get quick results to judge the efficacy of your design and the appropriateness of the yarn.

For this project, the needlepoint area to be worked is a simple rectangle, approximately 9 by 16 inches. I have chosen the flame stitch bargello pattern, but any pattern of your choice is fine. The flame stitch is easy and versatile, allowing for variations in the number of rows per color.

SPINNING NOTES

I worked with handspun yarn created by C. S. Peterson for her Maine-based studio, Woolscapes. This beautiful two-ply worsted-spun yarn is a sturdy worsted weight. The moderate to high singles and ply twist spun from Targhee wool is a great fit for bargello. The color variations run randomly throughout the skein, from light to dark with hues of aqua and gray. I chose a solid-color millspun yarn as my contrasting yarn. Experimenting with all handspun yarns or a combination of handspun and millspun can offer even more color and texture opportunities. Assembly is straightforward and is presented here assuming the sewing will be done with a machine.

MATERIALS

Fiber Targhee wool, 3 oz (85 g).

Yarn MC: 2-ply; about 120 yd; 800 ypp; 10 wpi; worsted

weight; handspun by C. S. Peterson of Woolscapes; "Sailing, Sailing," random color variations.

CC: Maine Line DK 3/8, 100% wool, worsted spun; 120 yd; 1,490 ypp; Jagger Spun; Willow.

Notions Cotton mesh canvas #12, 19" × 12" rectangle (includes 1½" margin of mesh around the bargello stitching area which is 16" × 9"); tapestry needle (blunt end, elongated eye), size 18; small scissors; soft, pliable thin leather, easy to stitch through: 8" × 8" square for the bottom, 1¼" × 17" for the handle, and ¾" × 17" strip for the trim band. For the optional lining: stiff interfacing (I used Peltex Firm, nonfusible), 16" × 9"; linen fabric, 18" × 11"; needle and thread for handsewing. **Finished Size** 9" high, 5" diameter, 16" circumference.

SPINDLE BAG

Needlework

Using masking tape, tape around all sides of the 19" × 12" rectangle of cotton mesh canvas, folding the tape in half over the raw edges.

Refer to the flame stitch chart, Figure 1. You will see that it is a 4:2 pattern (includes 4 holes with a 2-hole step). The first row is the foundation row. It is the most important and will take accuracy and patience! Once you have this row set, the rest will fall into place easily. Just in case, bargello stitches can be undone by picking out individual stitches with your needle.

Start about 1½" above the longer bottom edge and 1½" in from the right edge (the bottom right corner of the stitching area). Cut an 18"–24" length of MC and thread your tapestry needle. To begin your first vertical stitch (A on the chart), insert the needle from under the canvas and bring the needle up toward you. Draw the yarn up, leaving a tail about 1" long. Press this tail against the back of the canvas toward the left while you take the next few stitches so that the tail will be caught and secured as you stitch. Pay close attention to the chart on this first row as you work from right



Sampling is a blast with small pieces of canvas, a little time, and a bit of precious handspun.

to left, following the chart blocks (using 4 holes for the vertical stitch, then up or down 2 holes for the step as the chart indicates) working from A to B on Figure 1. Repeat across the canvas until you are 1½" from the left edge. Secure the yarn on the back by weaving it under a few stitches on the back. The next row (CC) begins in the top mesh hole of the first stitch where you began at A, then continues in the same pattern as the foundation row. Fill the entire canvas in this manner, alternating colors for each row. Stay in pattern as you stitch at the top and fill in at the bottom, keeping edges straight.

To block, steam lightly to maintain a rectangular shape. Dry thoroughly.

Tote Assembly

Trim the canvas mesh so there is a ¾" seam allowance around the bargello stitching.

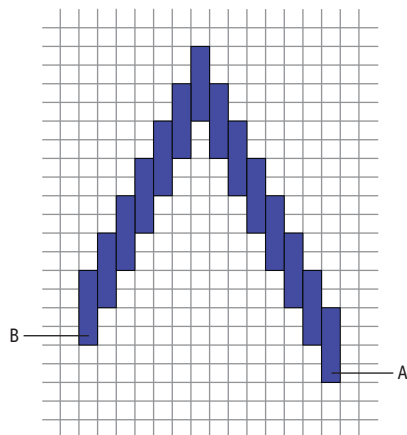
To form the cylinder, with right sides facing, machine stitch the shorter sides together, catching the end rows of bargello stitches. Continue assembly with the right sides to the inside.

From the 8" square of leather, cut a circle 7" in diameter, about 1" wider all around than the bargello cylinder circumference.

Center the cylinder on the leather circle with the leather right side up. Clip small slits 1" apart into the mesh perpendicular to the bargello stitching but do not cut as far as the stitching. This will allow the cylinder edge to lie flat. Fold the mesh tabs outward, so the bargello stitching is next to the leather.

With the mesh side up and the leather facing up underneath, stitch the leather and cylinder together as close to the bargello stitching as possible. You may need to stitch around a couple of times so that your stitches

Figure 1. Flame Stitch Chart



are at the very edge of the bargello stitches.

For the leather handle, draw two straight lines equidistant along the length of the $1\frac{1}{4} \times 17$ " leather piece. Cut along the lines to within 1" from one end. You will have three equal widths of leather attached at one end. Braid, then sew across at the end to secure.

Turn down the top mesh of the cylinder toward the wrong side so there is a smooth edge where the bargello stitching starts. Center the handle ends so they are directly across the rim from each other and pin 1" of leather handle end on top of the bargello stitching. Sew to secure.

Position the $\frac{3}{4}$ " leather trim band close to the upper edge of the cylinder, covering the handle ends, and topstitch in place along the upper and lower edges.

Turn right side out.

Optional Lining

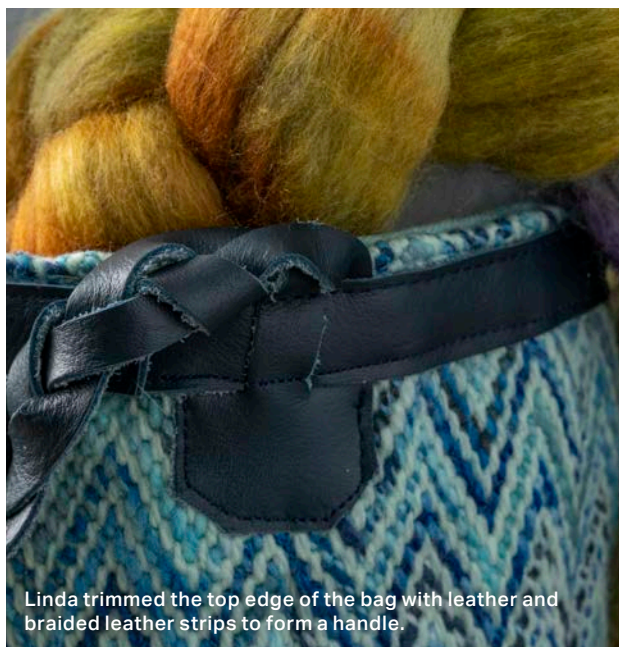
Center the interfacing on the wrong side of the lining material. Press the two long edges of lining material over the interfacing so there is a crisp fold. Topstitch the long edges. With right sides together, sew the short edges together with a 1" seam. Press the seam open. Insert the lining into the bargello cylinder (wrong side of cylinder to wrong side of lining) so it fits snugly to the bottom and just barely reaches the top inside edge. Handstitch the lining to the inside edge of the top of the bargello cylinder. ●

Resources

Perry, Linda M. *Back to Bargello: A Collection of Colorful Techniques and Patterns*. Self-published, 2014.

Woolscapes, woolscapesme.com.

A lifelong lover of all things fiber, **Linda M. Perry** now lives and creates on an island on the Maine coast. Several years ago, with the hope of reigniting the art and craft of bargello needlepoint, she wrote a primer book, *Back to Bargello*.



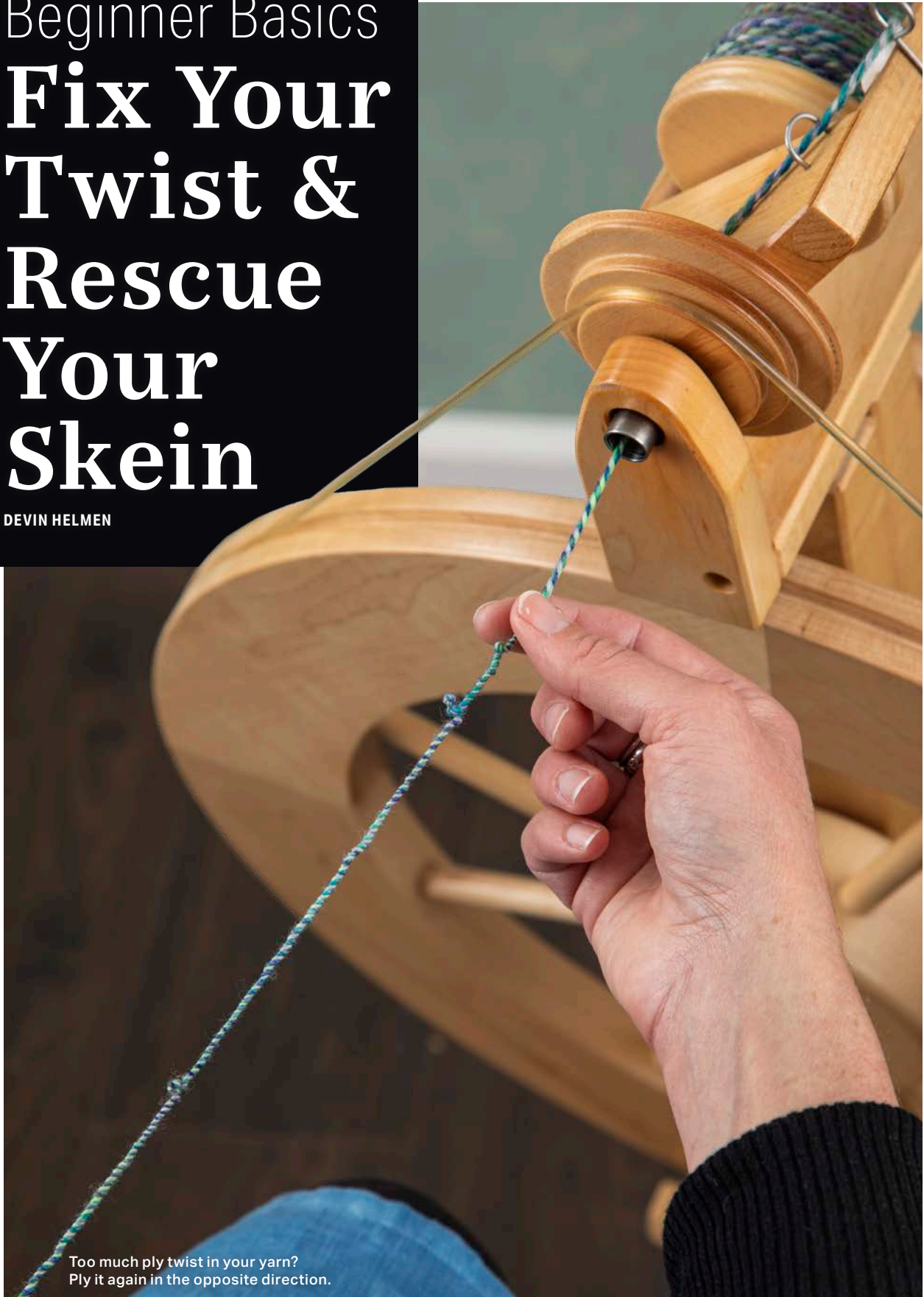
Linda trimmed the top edge of the bag with leather and braided leather strips to form a handle.



Detail of the seam

Beginner Basics **Fix Your Twist & Rescue Your Skein**

DEVIN HELMEN



Too much ply twist in your yarn?
Ply it again in the opposite direction.

Photos by Matt Graves

No matter what our spinning skill level may be, we sometimes look at our yarn after it is wet-finished and feel disappointed. Sometimes it is just a small sample; at other times it is a full skein . . . or skeins.

The first thing I do when I am unsatisfied with yarn after wet-finishing is try to learn from the experience. Did I overspin it? Underspin? Was I not paying enough attention? Should I use a faster whorl or a slower one next time? Should I have used a different drafting method?

After diagnosing the problem and deciding how to improve my work next time, I can look for ways to rescue my unsatisfactory skeins. It may be underspun or overspun, or just not suited to the purpose I envisioned. There are many scenarios, but one of the most important lessons I learned early in my spinning life was that the last layer of twist can be easily fixed. You can simply send the yarn back through your wheel or onto your spindle to remove or add twist until you get the yarn you want.

A CORRIEDALE CASE STUDY

Recently, I worked through a beautiful Corriedale fleece. After my skeins were washed and dried, I ended up with a fleece's worth of yarn that I could not imagine using. It was pretty to look at and soft to touch, but I had no desire to make anything with it because I knew the completed object would pill almost as soon as it was made due to the low twist in the singles and the two-ply yarn. The amount of twist to put into yarn is very much up to personal taste, but I prefer to work with yarns that have more ply twist, even if the singles are low twist. This makes for a more durable yarn that will wear better in whatever use I put it to.

What Went Wrong?

In this case, I was spinning batts I had drumcarded using underwashed fleece. After carding, the slightly greasy batts sat for about six months, and the grease hardened a bit. When I spin this sort of fleece, I notice



Devin felt this Corriedale handspun needed more ply twist. *From left: two-ply handspun yarn before re-plying and the yarn after re-plying and wet-finishing*



All four skeins are the same length. *From left:* underplied, overplied, plied in the wrong direction, balanced handspun knitting yarn

that I am often fooled about the amount of twist in the singles and the plied yarn. The hardened grease can make the yarn feel more solid and twisted than it is. I had spun the singles and plied them, satisfied with the yarn and looking forward to making something with

it. But once I wet-finished the yarn, the grease washed out, the fibers bloomed, and I could see that both singles were underspun and there was not enough ply twist for my taste.

What Can I Learn?

It's fine to spin batts that are not fully scoured, but wet-finishing a sample skein is the best way to make sure that the singles and ply both have enough twist.

How Do I Rescue My Handspun?

To rescue this yarn, all I need to do is ply it again, adding just enough *more* plying twist to get the yarn I want. Because I don't want to add too much twist, I may use a larger whorl on my wheel than I did the first time, feed the yarn on faster, or treadle slower to insert the right amount of twist. A bit of sampling will answer the question in just a few yards.

Once I have added more twist, I will wet-finish the yarn again. Then I can use it, confident that the time I spent to make this yarn will not go to waste in a textile that wears out quickly.

It All Comes Out in the Wash

There are several things that can cause yarn to turn out differently than you planned. If this happens, the most important thing is to wait until after you wet-finish the yarn to evaluate it. There are many opinions about finishing: wash and snap, wash and weight, steam, and on and on. I go by the rule of thumb that if the textile I am planning to make will be washed, my handspun yarn should be, too. I wash handspun knitting yarns in hot water, rinse in hot water, snap, and hang to dry. For weaving yarns, I wash and often size them.

Yarns tend to change when washed and dried. The changes might be subtle or dramatic and are largely determined by the fiber you started with. Not until finishing is complete can you truly judge your yarns.

Can you change the twist in singles once the yarn is plied? I have seen it done, and while possible, it is a great deal of trouble and at huge risk of producing tangles, frustration, and bad language.

TIPS FOR RESCUING YARN

First, it is important to note that the “right” amount of twist is largely a personal choice. High-twist yarns are typically more durable and long lasting. Low-twist yarns have more loft and a softer hand. Most spinners spin yarn that is somewhere in the middle, and the choice is up to you.

Here are some tips for rescuing your finished plied yarns, finished singles yarns, and bobbins of singles ready for plying if the twist isn’t what you’d hoped. All three methods send the yarn back through the wheel again, so if the yarn is in a skein, you will need to wind balls, place the skein on a swift, or keep the skein in a tidy loop over your lap. If you are working with bobbins of singles, place them on a lazy kate.

If Your Yarn Is Underspun or Underplied

To add twist to singles or a plied yarn, attach the end of your yarn to a leader as you usually do and begin spinning in the same direction the wheel was moving the last time the yarn was spun. For example, for an underspun two-ply that has two Z-twist (spun clockwise) singles that were plied with S-twist (counterclockwise), you will add more ply twist by spinning S (counterclockwise) again. You may find that you need to slow your treadling or slow the speed of the wheel by changing to a larger whorl size. You can also try feeding your yarn in faster than you did on your original spinning or plying run to make sure that you do not add too much twist. I recommend adding twist to a small sample and wet-finishing it to see if you are satisfied with the final yarn.

You can also plan to add twist using this technique when spinning high-twist yarns from shorter staple fibers such as cotton. I know several spinners who spin cotton in two steps, first adding enough twist to hold the yarn together and then spinning it again to add more twist. This allows them to spin at a comfortable rhythm without waiting for sufficient twist to accumulate after drafting.

If Your Yarn Is Overspun or Overplied

You can remove twist from singles or plied yarn by running your yarn through the wheel and making sure the wheel is turning the opposite direction. For example, an overspun two-ply has two Z-twist (spun clockwise) singles that were plied with S-twist (counterclockwise), so you will remove some of the excess ply twist by spinning Z (clockwise).

If You Plied in the “Wrong” Direction

In most cases, we spin singles in one direction and ply those singles in the opposite direction. Beginners (and even experienced spinners) occasionally accidentally ply in the direction the singles were spun, creating a highly energized yarn that might not work for the intended textile. These yarns coil up like a spring, as you can see in the image on the previous page.

To rescue your yarn if this happens, simply run it back through the wheel in the direction the yarn should have been plied. For example, if a two-ply yarn has two Z-twist (spun clockwise) singles that were also plied with Z-twist, you will add balance by spinning S (counterclockwise). This can take time, so you might need to slow the speed at which you are feeding the yarn onto the bobbin or adjust your wheel to a smaller, faster whorl.

DID IT WORK?

Make sure to wet-finish the yarn before making any judgment. The moisture will reactivate twist and allow the fibers to bloom and nest together. Once this is done, you can decide if the yarn is right for your project. ●

Devin Helmen has been immersed in fiber since learning to spin at age eight. They spin, knit, and weave in beautiful Minnesota. Devin enjoys writing and teaching about fiber arts and has a passion for spindles and everyday textiles. They blog, intermittently, at afewgreenfigs.blogspot.com.



Tapestries in museum collections often show dye fading on one side, while the other shows colors closer to their original vibrancy. Tapestry (LC0744) depicting characters from the biblical parable of the wise and foolish virgins, Norway, early 1900s. Wool on linen. 76.5" wide x 28" high.

Collection of Vesterheim Norwegian-American Museum, Decatur, Iowa

Conservation of Color

ISABELLA ROSSI

Have you ever spent hours dyeing, spinning, and knitting the perfect sweater to then watch the bright colors fade with every wash? Or maybe you noticed that the handwoven blanket you keep on the back of your chair near the window has lost its vibrancy? Dye fading is a recurring problem that I've seen in textiles old and new due to a variety of environmental factors.

In addition to being a spinner, I am a professional textile conservator trained to prevent and treat damage to historical textiles. Dye fading is a common problem we see when working with textiles both ancient and modern, large and small. Tapestries, for example, often have completely different colors on their reverse. Upholstery fabrics are vivid where the fabrics

have been covered. Well-worn and washed dresses lose their intensity over time. Unfortunately, this damage is irreversible, and nothing can be done to repair it. Understanding how dye fading happens can help us prevent it in our handspun yarns and projects.

WHAT ARE DYES?

To understand how dyes work, you first need to understand the origins of color. White light is a combination of all of the colors of the visible spectrum. When light hits an object, the object absorbs some wavelengths of light and reflects others. The reflected light enters our eyes and is perceived as color. Each color corresponds to a specific reflected wavelength. For example, the lovely indigo-dyed skein of yarn that you made absorbs all light except indigo and reflects indigo-colored light to your eye. Dyes are a way to alter which wavelengths of light are reflected by textiles, changing their perceived colors.

Fibers have their own natural colors, a mix of whites, browns, and blacks, which are all lovely in their own right. These colors are inherent to the fibers, so they do not wash out and are resistant to, but not immune from, light fading. But humans, as early as 36,000 years ago, were not satisfied with these familiar shades and learned to use dyes to expand the colorful possibilities of their textiles.¹ But what exactly are dyes and how do they work?

A dye is a colorful compound that can be attached to a fiber.² Dyes appear as colors because their chemical structures reflect certain wavelengths of light that we see as color. The elements of the dyeing process—which might include heat, water, and salts or other additives—all help the dye compounds bind to the fiber. Dyeing creates chemical bonds and molecular interactions between the fiber and the dye. These bonds and interactions keep the dyes attached to fiber to make your textiles colorful. When a textile appears to be faded, the dye has been altered to lose its color or has become detached from the fibers over time.

Unfortunately dye fading occurs with natural and synthetic dyes. There are no easy rules about which dyes fade and which are resistant. Synthetic dyes are not always more fast than natural ones or vice versa.

How each dye reacts to light and washing depends on the inherent properties of the dye, the material it is bonded to, and how an object is treated. For example, I conserved an embroidered piece of mid-nineteenth century Berlin wool work. Although all of the embroidery had been exposed to the same conditions, the stitches worked in purple silk faded considerably more than the ones in red wool. This was because the early purple dye used and the silk it was bonded to was more sensitive to light. To understand and prevent dye fading, conservators and fiber artists need to understand how this process occurs.

HOW TO MINIMIZE DYE FADING

There are simple ways to prevent excessive fading when it comes to our personal textile collections. Understanding light fading, dye bleeding, and how to improve your dyeing technique can help you keep your textiles vibrant.

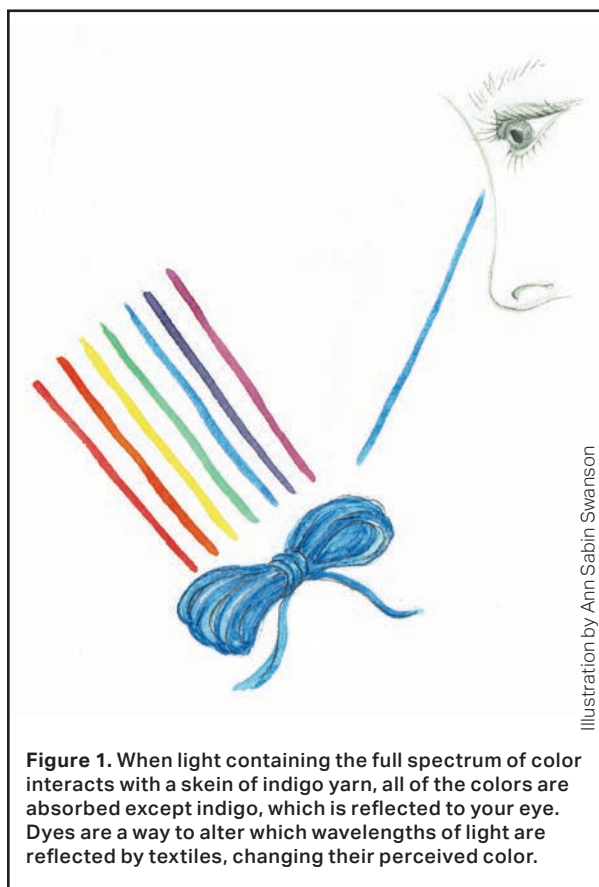


Figure 1. When light containing the full spectrum of color interacts with a skein of indigo yarn, all of the colors are absorbed except indigo, which is reflected to your eye. Dyes are a way to alter which wavelengths of light are reflected by textiles, changing their perceived color.

Illustration by Ann Sabin Swanson

Avoid Light Fading

Lightfastness is the ability of a dye to resist changing color when exposed to light. Light, especially sunlight, contains a lot of energy. When a dye is exposed to this amount of energy, the structure of the compound we see as color can change. This results in the dye changing color, often making it appear lighter. Over time, repeated exposure to light can cause the dyes to change from vivid to dull. Unfortunately, this is a permanent change that cannot be reversed.

The most effective way to prevent light fading is to completely eliminate exposure to light. However, for makers, this defeats the purpose of crafting. Spinners don't spend hours creating yarns that they can never use or see! Instead of the complete elimination of light, you can aim to reduce unnecessary light and therefore reduce fading. For example, don't use open shelves to display your yarn and fiber, especially in areas of your home exposed to direct sunlight on a daily basis. Hang your textile wall hangings on shaded walls rather than bright ones. Dry your garments inside out on the clothesline, or even better, inside on a clothing rack. Unfortunately, light fading is inevitable for all textiles,

but you can significantly extend the lifespan of your objects by avoiding unnecessary light.

Reduce Dye Bleeding

Washfastness is the ability of a dye to stay attached to a fiber during laundering. If a dye has poor washfastness, the dye will detach from the fiber. Have you ever put your new red shirt and your white socks together in the washing machine and your socks came out pink? The dyes have bled from the red shirt and reattached to your white socks. This is called dye bleeding, and the color of a dye that bleeds will fade with every cleaning. Most of the time, this fading is imperceptible, but over time, more dye will detach, leaving the fibers lighter than before.

The best way to prevent fading from washing is to launder something only when it is actually dirty. Reducing the number of times you wash a garment will extend the time that it's brightly colored. But eventually, you will need to wash your handspun garments. To decrease dye loss, launder your garments as gently as possible. Cold water and detergents designed for delicate clothes can reduce dye loss. Handwashing agitates garments less than machine washing and allows you to



Mitten with floral embroidery. Handknitted in Hallingdal, Norway, late 1800s. Wool on wool. 8.75" long × 3.75" wide.



Coverlet woven in geometric tapestry technique, Norway. Woven inscription reads, "Brita L D S 1889." Wool on cotton. 72" long × 55" wide.

Collection of Vesterheim Norwegian-American Museum, Decorah, Iowa

Collection of Vesterheim Norwegian-American Museum, Decorah, Iowa

watch for dye bleeding in the water.

Fiber fresh out of the dyepot will often have some dye on the surface that has not attached to the fiber during the dyeing process. This is one of the reasons why new garments bleed much more than old ones. When I wash freshly spun hanks of yarn or a newly knitted cardigan for the first time, I always wash them alone so that I can monitor how much dye is bleeding into the water and prevent them from staining other garments. Every time you wash a dyed textile, you can lose more of its attached dye molecules. However, this can be reduced by gentle laundering only when necessary.

Improve Your Dyeing Technique

If you're a dyer as well as a spinner, paying attention to your dyeing technique and handling of materials can greatly increase a fiber's resistance to fading. The best way to prevent the loss of color is to make sure that the dyes are well bonded to the fibers to begin with, making steps such as scouring vital to long-lasting color. If you're interested in dyeing your own fiber, yarn, or fabric, do some research about the dye before heating up the dyepot. Certain dyes will only attach to particular fibers and will not yield colors on other materials.

Always check the dyeing instructions for necessary additives. Since they're an extra expense and step, it can be tempting to skip them. However, many dyes require additives to properly bind with fibers. For example, when working with natural dyestuffs, mordants are often necessary for successful dyeing. Additives vary depending on the type of dye and fiber, so it's always best to know what is needed before starting a new project.

It is also important to follow the dye cycle when using your dye. The dye cycle is like a recipe, indicating when to add each chemical, the appropriate temperatures, and how long your fiber needs to be exposed to the dye. For example, acid dyes require the dyepot to reach a certain pH and temperature to bond effectively. This information can be found on manufacturers' websites for synthetic dyes and in a plethora of natural-dyeing resources. The pH of the dyebath can greatly alter the staying power of your

dyes. Using pH monitoring strips to check the acidity or alkalinity of the dye solution can help you improve the effectiveness of your dyeing and provide long-lasting results.

When choosing a dye for a project, researching washfastness and lightfastness can be helpful. This information can be found online or in books dedicated to dyeing (especially those aimed at professionals). Some dyes, such as indigo, score well in both categories, while lichen dyes are notoriously short-lasting. Is your handmade textile going to be frequently washed and exposed to sunlight? Are you weaving stripes or knitting colorwork patterns? I would recommend finding a long-lasting dye. Dyes with high fastness are usually more expensive, but the added cost may be worth it for making a textile that will last. Or maybe you want to make a woolly hat dyed with lichens that you don't mind overdyeing again in a few seasons? Do your research and then chart your own maker's path.

CONCLUSION

Dye fading is inevitable and irreversible as we wear and wash the textiles we make. However, by reducing light exposure, laundering carefully, and improving your dyeing techniques and materials, you can extend the longevity of your colors. It can be difficult to watch the textiles that you spent so much energy in creating fade over time. However, one of the beautiful things about handmade textiles is that they are mementos of the effort put into crafting them, and each item holds memories of its use and the care you have given it over time. ●

Notes

1. Michael Balter, "Clothes Make the (Hu) Man," *Science* 325, no. 5946 (September 11, 2009), 1329.
2. As opposed to a pigment, which is held onto the surface with a binding agent. Paint is a combination of a pigment and a binding agent.

Isabella Rossi is a textile conservator and an avid fiber crafter. She lives in Haddington, Scotland, and is the treasurer for the West of Scotland Guild of Weavers, Spinners, and Dyers. She also writes about how textile conservation can improve your crafting on her blog, spinsterconservation.com.

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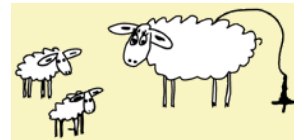
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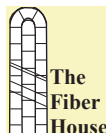
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The Towline Hat

Tunis Wool for Bouncy Cables

KERRY BULLOCK-OZKAN

Cables aren't necessarily the first thing that comes to mind when thinking of projects for woolen-spun yarns. Smooth, round worsted-spun yarns are usually recommended for making cables pop. But after sampling this Tunis lambswool from Tarheelbilly Farm, I immediately thought of knitting a hat with squishy cables similar to the Aran wool hats my mother and I once wore.

According to *The Fleece and Fiber Sourcebook*, American Tunis is a dual-purpose breed with an interesting history. Tunis lambs have a reddish color to their wool when born, which fades to a creamy white over time. The fiber was soft and bouncy, with a warm cream color and medium staple length, and it fluffed up pleasantly when finished.

SPINNING NOTES

I spun the sample from roving with minimal preparation, only shaking the fiber out a bit to loosen it up. I chose to make a woolen-spun three-ply for several reasons. I think the bounce and crimp of the fiber paired with the loft resulting from the woolen spinning helped to make up for the loss of stitch definition due to the slightly fuzzy surface of a woolen yarn. The

Our wish for you in 2022 is that you give yourself the gift of time to spin! As a thank you to our subscribers—and a nudge to pull 5 ounces of squishy indulgence from your stash—we have released a bonus pattern.

Kerry Bullock-Ozkan created this toasty hat using American Tunis roving purchased from Tarheelbilly Farm. Charis Walker and her family raise Tunis sheep, Galloway cows, bees, and more in Ohio. Learn more about Tarheelbilly Farm and get a free tutorial on cabling without a cable needle at spinoffmagazine.com.

*Best wishes to all of you from all of us!
—Kate Larson and the Spin Off team*

Photo by Matt Graves



three-ply yarn structure also gives a nice roundness and height to the cables.

I spun the singles with a long draw on a spinning wheel with a ratio of 9:1, aiming for a worsted-weight finished yarn. I plied with a tighter twist angle of approximately 45 degrees in order to maximize the roundness and bounce of the yarn. This technique works well when spinning such bouncy, squishy yarns. I finished the yarn by soaking it in hot water with a bit of Eucalan before thwacking it against a table. The final yarn came in at 9 wpi with a grist of about 650 yards per pound. Knit at the pattern gauge, it makes a very dense, warm hat perfect for the coldest winter days. ●

If you subscribe to this magazine, log in to get your bonus pattern at LT.Media/Towline.

Resources

Robson, Deborah, and Carol Ekarius. *The Fleece & Fiber Sourcebook*. North Adams, MA: Storey Publishing, 2011. Tarheelbilly Farm, tarheelbillyfarm.com.

Kerry Bullock-Ozkan is a knitwear designer and textile artist. Follow her adventures in spinning all the breeds at bullockozkandesigns.com.