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Special Feature

Japanese Fabrics Have Their Global Reputation Wrapped Up



niponica is published in Japanese and six other languages (Arabic, Chinese, English, French, Russian and Spanish), to introduce the world to the people and culture of Japan today. The title *niponica* is derived from "Nippon," the Japanese word for Japan.

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Furoshiki Cloth for Wrapping Things



Above: Rolls of cloth on the shelves of a kimono shop. The silk, linen and cotton fabrics were expertly woven and dyed, and will soon be made into kimono. The kimono has always set the latest styles in the world of fashion. (Collaboration: Ginza Motoji. Photos on this page by Takahashi Hitomi)

Cover photo: Two bottles wrapped in a single *furoshiki*. (Collaboration: Aflo)

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Special Feature

Japanese Fabrics Have Their Global Reputation Wrapped Up

Japanese dyeing and weaving techniques handed down from one generation to the next in different parts of the country have created a wide variety of fabrics and made life more convenient, comfortable and enjoyable. Today, advanced technologies are being used to create cutting-edge textiles that make life better for people around the world.



How to wrap something in a *furoshiki*

Photos by Ito Chiharu
Collaboration: Musubi

The *furoshiki* is a square piece of cloth used for wrapping and carrying a wide variety of objects easily. (See page 28.) It is sometimes used to wrap presents in an especially courteous way. This page shows how to wrap two bottles in a single *furoshiki* (cover photo), and how to wrap a watermelon.

Two bottles in one *furoshiki*



1. Spread the *furoshiki* out flat, and place the two bottles on an imaginary line between two opposite corners, separating the bottles a little.
2. Take the front half of the *furoshiki* and place it over the bottles.
3. Roll the bottles away from you, wrapping them in the cloth.
4. Take hold of the two ends, and stand the bottles upright.
5. Make a double knot to tie the two ends together tightly.
6. Make the knot tidy, and you are ready to go.

Watermelon wrap



1. Spread the *furoshiki* out flat, and place the watermelon in the middle.
2. Tie the two corners near you together.
3. Tie the other two corners in the same way.
4. Take the knot near you and pass it through the hole under the knot you made further away from you.
5. Pull the upper knot up, and you now have an easy way to carry your watermelon.



Textiles and Japan

Since ancient times the Japanese have refined their dyeing and weaving techniques, shaping and coloring their culture along the way to a bright future.

Written by Nagasaki Iwao

It is not clear when the Japanese mastered the art of making cloth, but we can assume they were using cloth for many purposes by the time they established a farming culture in the 4th and 3rd centuries BC. Silken fabrics woven into patterns have been unearthed from ruins of the 5th and 6th centuries AD. Beginning around that time, cultural elements and artisans are believed to have entered the country from the Korean peninsula and China, bringing new ways to make cloth.

Imported goods as teacher: The Japanese learn new techniques, and make them their own

Weaving techniques in Japan saw more refinement in the 7th and 8th centuries, when many cultural elements entered from Sui and Tang China. One prime example is *nishiki*, an ornate and colorful *mon-orimono* featuring a raised, brocade pattern. Also produced by this time were dyed goods. The most notable dyeing methods that appealed to people then include:

- **Shibori-zome** tie-dyeing: Thread is used to tie parts of a fabric, so the dye that cannot reach those parts.
- **Bosen** resist dyeing: Melted wax is applied to parts of the fabric so that the dye does not penetrate there, leaving a pattern.
- **Itajime-zome** board dyeing: The cloth is clamped tightly between wooden boards that have a pattern carved in relief. The clamped parts of the cloth are protected from the dye, leaving a white pattern.

Embroidery also began around the same time. The above-mentioned dyeing techniques and embroidery were used not only for clothing but also for floor coverings and decorated fabrics hung from the pillars and ceilings of Buddhist temples.

After diplomatic relations with China were suspended in the 10th century, clothing took on a distinctive Japanese style. Rather than fabrics being dyed after being woven, fabrics woven from dyed threads were adopted by the upper class. It became fashionable to wear multiple thin garments of different colors, each made from *mon-orimono* silk and showing its own hem, collar and sleeves in a beautiful layered color arrangement.

The front and reverse of fabric was adorned in different color combinations to form motifs depicting the appearance of plants, insects or other aspects of nature during a



specific season. Each motif had its own name, and there were about 130 color combinations. The motif chosen would match the current season.

The kimono leads fashion culture to new dyeing and weaving techniques

Between the 13th and 16th centuries the *kosode*, which evolved into today's kimono, took on a central role in Japanese fashion for all classes. And then, in the early 17th century, when the Tokugawa Shogunate ushered in what would become 300 years of peace, women's fashion quite quickly evolved toward the ornate, although the level of ornateness depended somewhat on the social class.

New dyeing techniques appeared around the end of the 17th century, among them a process still alive today: *yuzen-zome*. In this technique, the pattern outlines are drawn like

pieces of fine thread, using a starch resist paste to protect the outlines from the dye. The result is remarkably colorful, exquisite patterns, so beautiful that the process spread to various parts of the country and was used not only for women's *kosode* garments but for other fabric goods as well, such as cloth for wrapping presents.

Thus, by early modern times a number of dyeing techniques were being used to create patterns unique to each respective technique. But the ancient *mon-orimono* raised brocade techniques did not completely die out. The Noh theater, with its masked actors, grew in popularity especially among the military class, and costume production soared. The fabric used for those costumes was often woven in the *mon-orimono* technique.

Cotton cultivation spread in the 18th century, spurring the weaving of cotton fabric. Cheap to buy, it was quickly adopted by the common folk, and cotton dyed goods were soon being produced in many areas. It was around this time that cotton fabric became part of the culture of ordinary people, one that lives on today in various forms, including tie-dyed cloth produced throughout the country, and fabric decorated with a *kasure* splashed pattern effect achieved by including speckled dyed thread in the weave.

Techniques passed down through the ages, into the future

After Japan's feudal system ended in the late 19th century, the influence of Western civilization swept in. Although the nation's fabric traditions still lived on, completely new approaches to dyeing and weaving were also seen in the importation and further development of chemical dyes and weaving machines. These led to techniques prevalent in Japan's modern culture of dyeing and weaving.

Traditional clothing changed in the face of new technologies, and new buildings constructed in the Western style had some of their walls and their chairs covered in the new fabric styles. Even the traditional *furoshiki* cloth for wrapping objects was made with the new techniques.

Later, even more splendid chemical fibers were developed in Japan. But we cannot forget that the roots of today's fabric culture go back in an unbroken line to ancient times.



This is what formal feminine apparel looked like around the 12th century. The sleeves and hems of multiple *mon-orimono* silken garments express beauty through their bands of colors. (Property of the Kyoto National Museum)
Above left: This illustration of a woman wearing a *kosode* garment is called *A Beauty Looking Back*. By Hishikawa Moronobu (17th century). (Property of the Tokyo National Museum) Image: TNM Image Archives

Nagasaki Iwao

After serving as Director of the Dyeing and Weaving Division of the Tokyo National Museum, became professor in the Faculty of Home Economics at Kyoritsu Women's University, a position he currently holds. Has researched many aspects of the cultural history of Japanese clothing and garment ornamentation, including dyeing, weaving, attire and patterns. Often involved in the planning of exhibitions on dyeing, weaving, clothing and garment ornamentation.

Dyeing and Weaving

Japan's textile culture—Shaped by a rich array of techniques

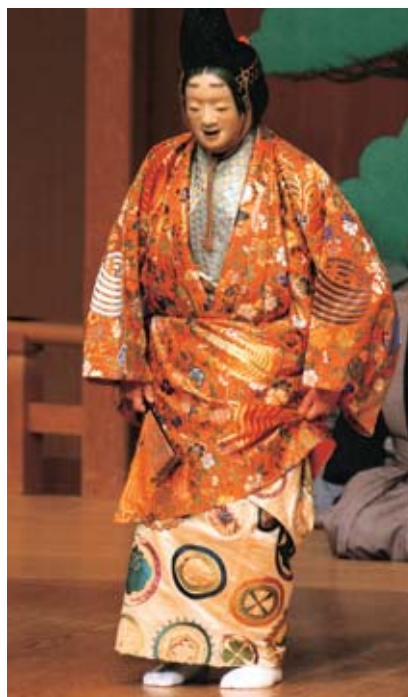
錦

Nishiki



Nishiki is woven from colorful thread to create fabric featuring a raised brocade pattern. Reflecting influences from West Asia and China, *nishiki* techniques have been refined in Japan over centuries and are still used today to make sashes, garments worn by Buddhist priests, and costumes worn in Noh and Kabuki plays.

Collaboration: Tatumura Textile Co., Ltd. Photos by Takahashi Hitomi



Above: The *shite* (main role) in the Noh play *Dojoji* is costumed in a type of *nishiki* called *karaori* (worn here by Kanze Kiyokazu, 26th head of the Kanze School of Noh; photo by Hayashi Yoshikatsu).

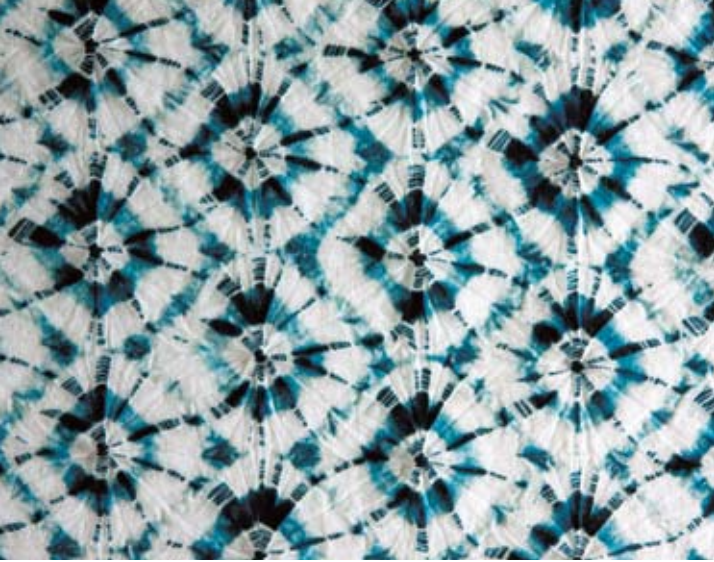


Top: More than 40 different colors of thread are used to weave a single *obi*.
Bottom: A weaver sits quietly at a loom creating *obi* with intricate patterns achieved by manipulating the warp threads.

Left: Gorgeous *nishiki* brocade fabric woven by Tatumura Textile located in Nishijin (Kyoto), an area famous for producing textiles of extremely high quality. The company is also actively involved in reviving patterns that depict cultural treasures from the Nara Period (8th century).

Page 7: Medieval *shohegiga* (wall painting, right); flowers (back left) originally painted by Hon'ami Koetsu (1558-1637) are reproduced in magnificent *obi* crafted in silver and gold foil and colorful silk thread.





Shibori-zome dyeing refers to a set of dyeing techniques used to create simpler patterns by binding, stitching or folding the fabric to prevent dye from coloring those areas of the cloth. Although tie-dyeing techniques have evolved in many cultures around the world, Japanese *shibori* is unique in the wide variety of patterns that have developed.

Collaboration: Takeda Kahei Shoten and Arimatsu-Narumi Shiborikaikan
Photos by Takahashi Hitomi



Above: The fingers of a master artisan work their magic, binding cloth onto which an initial pattern has already been painted/stenciled.
Left: *Arimatsu shibori*, originating in the Aichi Prefecture town of Arimatsu, is a well-known style of cotton *shibori-zome*. Inheriting tradition from the early 17th century founder of the *Arimatsu shibori* school, Takeda Kahei Shoten displays an amazing spectrum of *shibori* patterns, including the *kumo shibori* pattern that resembles spider webs and *kanoko shibori*, a technique that involves tying off small bobbles of fabric to create speckled cloth with a bumpy texture. Today, fabrics woven by intentionally omitting intermittent warp threads to retain a bumpy or wrinkled texture can be found worldwide.



Kimono fabric in a *ro* weave so thin as to be practically transparent (left) and a light and cool *obi* woven in the crisp, mesh-like *ra* style (right, created by Kitamura Takeshi). A rich array of weaving techniques developed by master kimono weavers have long kept the Japanese people comfortable during the country's hot and humid summers. (Collaboration: Ginza Motoji)

羅

Ra



紗

Sha



紹

Ro



Silk gauze is a transparent open weave fabric created from a complicated intertwining of warp thread. There are three basic styles of gauze weave in Japan: *ra*, *sha*, and *ro*. Known collectively as *usumono* (literally, thin fabric), silk gauze is thought to have first been worn in the summer by court nobles, samurai and other members of the upper classes in the early 8th century.

Photos by Takahashi Hitomi



To create this *ra* weave shawl (right), four extremely thin warp threads are threaded through each loop on the loom. (Collaboration: Tatsumura Textile Co., Ltd.)

From left: A *ra* weave discovered in a historical city, now an ancient cultural asset: a *sha* weave in a pattern of grapes, 18th century (both from the Tokyo National Museum collection, image: TNM Image Archives); a *ro* weave in a sweet chrysanthemum pattern, 19th century (from private collection).

友禪

Yuzen



Colorful *yuzen-zome* dyeing textiles quickly came into fashion when they first appeared around the 17th century. This form of resist dyeing, which involves applying thin lines of starch resist paste to woven cloth to outline the design, made it possible to create more delicate patterns and threw open the doors to a wealth of pictorial possibilities in kimono design. In gorgeous colors that lavishly envelop the woman who wears them, *yuzen-zome* fabric is popular even today.

Left: Designs evoking Western oil paintings of flowers debuted with the advent of *yuzen-zome* (early 20th century, from a private collection).
Right: Bold design of *Yaezakura* (double-flowered cherry blossoms) in full bloom entwined in bamboo latticework (18th century, from the Joshibi University of Art and Design Art Museum collection).
Page 11: Gorgeous kimono with embroidery-adorned design featuring decorative objects and auspicious motifs such as pine, bamboo and plum (1938, created by Okumi Shinichiro, from the Ishikawa Prefectural Museum of Art collection).



The appeal of *Kurume gasuri* dyeing lies with its simple but powerful designs. Developed primarily in the Kurume area of Fukuoka Prefecture, these patterns were adopted for clothing worn by common folk and later spread to regions across Japan.

絣

Kasuri



The patterns in *kasuri* fabrics are woven from dyed threads rather than created by dyeing woven cloth. This technique makes it possible to create colorful, intricate designs as well as lattice and other patterns using even the simplest weaving techniques. *Kasuri* literally translates as grazed, and this style takes its name from the grazed edges of the patterns.

Collaboration: Ginza Motoji and Kurume Gasuri Cooperative
Photos by Takahashi Hitomi



Before the fabric is woven, the thread is bound with hemp (lower right), separating sections left undyed to form a white pattern and sections to be shaded in light to dark indigo (left).



A *kasuri* pattern originating from Tottori Prefecture, *Yumihama gasuri* is dyed and woven into cotton cloth used to make work clothes and futon covers.

Modern Fabrics for Today's Lifestyles

Fabrics with special functions, modern textiles born from expertise and advanced technologies... These pages show how traditional weaving techniques have always evolved, blending with ever-newer technologies to become today's fabrics, making our lives more convenient, comfortable and enjoyable.

Photos by Murakami Keiichi and Takahashi Hitomi
Collaboration: UNIQLO Co., Ltd., Atsugi Co., Ltd. and Unicharm Corporation



ASTIGU stockings made by Atsugi Co., Ltd. offer a woman the opportunity to match her mood as she chooses clothes for the day. One series, with the signature Hada mark, creates the impression of an invisible stocking yet comes in 12 colors, each a subtle shade different from the others to match skin color and clothing style.

Flattering for legs, and comfortable, too Stockings of superlative quality

Stockings are a big item in Japan, a way to show neatness and respectability. Made-in-Japan stockings are known for their excellent quality, and now more and more of them are adding charm to women's legs in new ways. For example: some are chosen to match leg color, just as foundation cosmetics match skin color; some give the leg a slimmer look through the use of threads that stretch for a tighter, firmer effect; some use double threads to reduce the risk of ripping; some are woven with smooth threads for a transparent look; and others have all five toes. And then, for hot and humid weather, there are others that feature UV protection, or help eliminate odors and bacteria. Offering more comfort than a bare leg, and adding charm, as well—stockings made in Japan do this and more.

The use of double nylon threads makes stockings more tear-resistant.



Stockings designed for a transparent look are woven from single, thin nylon threads.

Paper diapers for baby comfort Gentle on the skin, and a just-right fit

Infant skin is said to be only about half as thick as adult skin. Disposable diapers made of paper, unlike woven cloth, have short fibers, so they are generally hard to the touch and cannot stretch. If a baby wears paper diapers day in, day out, the skin tends to become chapped and subject to diaper rash. These disadvantages led to the development of a new material, SOFTRETCH®. Its fine fibers are made into a non-woven fabric, which is combined with another non-woven fabric that can expand and contract. This results in a material that is soft on the skin and adjusts its shape to match body shape. The diaper fits the form of the baby's body, remaining flexible as it moves, and therefore reducing the risk of chafing. "Gentle to a baby's skin" is always the ideal, and these paper diapers are the reality.



This paper diaper, brand name "moony," is made of SOFTRETCH® fiber. The manufacturer, Unicharm Corporation, is known for its high-quality sanitary products and disposable diapers. The company invested 12 years of research to perfect this type of diaper.



Sheet made from fine fibers. Even after the diaper absorbs moisture, the surface facing the baby's skin remains dry.

Cool in summer, warm on winter days Innerwear evolves to serve multiple functions

A clothing manufacturer and two textile enterprises joined forces to develop different fabrics with an important role—keeping you comfortable both summer and winter.

AIRism undergarments let perspiration escape and prevent sticking, no matter what the season or situation. They are gender-specific, using different fibers to account for gender differences. For men, who tend to perspire more, the innerwear is made of ultra-fine polyester fibers that excel in perspiration absorption and quick drying. For women, who tend to feel cold as their perspiration evaporates, the rapid absorption of moisture is controlled mostly by cupro fibers. AIRism inner garments for both men and women have added substances that combat bacteria and neutralize odors, for comfort even in hot, humid environments.

A material called HEATTECH is great for winter undergarments because it protects against the cold by actually generating heat. A combination of four different fibers in the weave work like this: rayon fibers absorb water vapor from the body, and change it into heat energy; this generated heat is retained within acrylic fibers; meanwhile, polyester fibers ensure rapid drying of the absorbed moisture; and polyurethane fibers provide stretchable comfort. Garments made of HEATTECH are light, comfortable, and warm just by wearing them. At first, HEATTECH was intended only for undergarments, but now it is also used for clothing made from jersey cloth, and for jeans, socks and more. Worldwide sales of HEATTECH garments have reached more than 300 million items, and innovation continues.

* Please note that some of the products shown above are no longer being marketed.



A sampling of garments made from HEATTECH, which uses body moisture to generate heat. The fabric was developed jointly by UNIQLO Co., Ltd. and Toray Industries, Inc.



Functional AIRism undergarments marketed by UNIQLO Co., Ltd. Fabric for men's wear, developed by UNIQLO and Toray Industries, Inc., is known for its smooth touch and quick-drying comfort. Fabric for women's wear, developed in collaboration with Toray Industries, Inc. and Asahi Kasei Corporation, also offers a smooth touch, and in addition helps to prevent cooling caused by evaporating perspiration.

Textile designer Sudo Reiko pushes the expressive boundaries of fabric, blending old dyeing and weaving techniques from different parts of Japan with advanced machine technology. These pages show how her creative interpretation of textile culture combines traditional techniques with contemporary innovation to bring new life to Japanese lifestyles.



Textile designer Sudo Reiko



"Eco-bag" made of fabric folded like origami. A paper weave pattern with mountain and valley folds is secured with polyester thread, then heat pleated. All done by hand.



Muffler woven from thick *kibiso* silken strands (the thick strands spun by silkworms just after they reach spinning stage). Made in collaboration with artisans in Tsuruoka City, Yamagata Prefecture, in an area known for its fine silk fabrics.



With the "origami weave" technique, the yarn in the fabric's warp and weft is shaped into 3-dimensional mountain and valley folds.



Above: Entrance to the Mandarin Oriental Tokyo Hotel, decorated in a theme based on Sudo's work, *Woodlands and Water in Japan*. (Photo by Okouchi Tadashi)
Left: This work of art by Sudo, entitled *Jukon* ("Tree Roots"), also adorns the hotel entrance. Woven stainless steel microfibers create the pattern, with pock marks added with a flame. (Photo by Sue McNab)



Right: Thin, double-woven feather organza made on a Jacquard loom, with bird feathers inserted by hand. This work of art combines factory techniques from Fujiyoshida (another area known for its fine silk fabrics) with handcrafting. Examples of this type of weave by Sudo are now in the permanent collections of art galleries in more than ten locations worldwide, including New York's Museum of Modern Art (MoMA).
Left: Feather organza jacket. Soft to the touch, and so light you would hardly know you are wearing it.

Sudo Reiko
Textile designer, professor at Tokyo Zokei University, and Artistic Director at NUNO Corporation. She makes good use of the advanced technology of Japan's textile production centers to produce unique fabric creations.
<http://www.nuno.com/>



Japanese High-Tech Textiles Circle the World, and Beyond

The integration of centuries-old textile arts with cutting-edge scientific technology—both impressive in themselves—has given rise to high-tech Japanese fabrics that have made a powerful mark on global industry. These materials protect spectators at the racetrack and in the stadium from wind, rain, and blazing sun, and they also provide ecological solutions for greening barren land and mitigating water shortages. Japanese companies have found ways to mass-produce an “artificial spider silk” that is stronger than steel, and high-tech textiles developed in Japan are playing a major role on the frontiers of space exploration.



Japanese Tensile Membrane Adds Color to Major Architecture Worldwide

An hour by car from the center of Shanghai, massive “lotus leaves” float in the air above the Shanghai International Circuit. Twenty-six of these tensile membrane roof structures shade the sub-stand seating for 20,000 spectators. Made of glass fiber coated in fluoroplastic, each leaf-shaped structure is an ellipse measuring 31.6m long and 27.6m wide and is held up by a steel frame pillar one meter in diameter. Evoking an image of overlapping lotus leaves floating placidly on the surface of a pond, this ultra-modern roof design employs technological expertise developed by Japanese companies for creating outstanding membrane structures.

As roofs, membrane structures are both lightweight and offer superior lighting, making them widely used for racetracks built without support columns, as well as large spaces with innovative architectural designs. Only a handful of companies, however, boast the expertise needed to produce this type of material. Creating complicated, three-dimensional tensile membrane structures requires extremely advanced techniques both in the manufacture of the cloth and on-site execution of the design.

The Arena Fonte Nova Soccer Stadium opened in April 2013 in the port city of Salvador on the Atlantic coast in northeastern Brazil. It seats 56,500 people and features a tensile membrane roof structure manufactured by the same company that created the “lotus leaves” for the Shanghai racetrack. The roof will shelter the seats at the Arena Fonte Nova when it hosts a quarterfinal match in the soccer World Cup to be held in Brazil in 2014.

Shanghai International Circuit (left) and Arena Fonte Nova (above) feature roofs manufactured and installed by Taiyo Kogyo. (Photos courtesy of Taiyo Kogyo Corporation)



Life-Sustaining Plant Turns Seawater into Drinking Water

Completely surrounded by ocean, the Caribbean islands of Trinidad and Tobago have struggled for many years with a chronic lack of drinking water. Today, a life-sustaining plant turns saltwater into drinking water, playing a vital role in the lives of the residents here. With a massive processing capacity of 136,000m³ a day, this is one of the largest desalination plants in the world.

The heart of the plant is a reverse osmosis membrane supplied by a Japanese manufacturer. Using macromolecular technology, tiny holes no more than a few nanometers in diameter allow only water molecules to pass through the membrane, keeping salt out. Equipped with 20,000 reverse osmotic membrane elements manufactured as industrial products, this plant desalinates ocean water to supply residents with drinking water.

Fresh water that people can actually drink accounts for only a small fraction of the planet's water, leaving most regions in the world struggling with a serious lack of water. Desalination plants capable of turning abundant ocean water resources into fresh potable water are contributing a great deal to resolving the global issue of water shortages.



Ocean water desalination plant in Trinidad and Tobago uses reverse osmotic membrane elements manufactured by Toray. (Photo courtesy of Toray Industries, Inc.)



Textiles Restore Life to Barren Land

In the suburbs of Johannesburg, South Africa, farmers are working hard to reclaim land laid to waste by mining. Central to these efforts are long fabric tubes manufactured using a method jointly developed by Japanese knit and fiber manufacturers. Farmers fill the tubes with soil and fertilizer, lay them in long rows on the ground, and plant crop seeds between them. Before long, corn and other plants take root in the tubes, and the fields gradually expand. At the same time, the tubes also help keep wind from scattering sand in the air. Knit from biodegradable polylactic acid fiber that will decompose into soil, these tubes are produced using *maruami*, a circular knit technique developed by Japanese knit manufacturers for outstanding elasticity. The tubes are easy to set up, and they also retain a great deal of water. This superior water retention allows farmers to grow crops even with a small amount of water and fertilizer. People will now be able to grow crops in the desert—even on concrete, so the idea is attracting a lot of attention.



Roll planter tubes laid out on barren land in South Africa are produced using biodegradable fiber developed by Toray and knit manufacturing techniques developed by Mitsukawa of Fukui Prefecture. (Photo courtesy of Toray Industries, Inc.)



Colorful QMONOS thread, a fiber made of protein to resemble spider silk, and a dress created from QMONOS fabric (Photo courtesy of Spiber Inc.)



Dream Fiber Changes the World

The area around Tsuruoka in Yamagata Prefecture, otherwise a pastoral town in the Tohoku region and one of Japan's leading producers of rice, is the surprising home of one of the most cutting-edge man-made fibers in the world. Stronger than steel and more elastic than nylon, the "artificial spider silk" produced here meets the needs of an array of industries that need fibers that are light, yet strong. This includes materials for automotive parts, artificial blood vessels, and human hair, as well as thread for clothing.

Although a great many scientists had attempted to create artificial spider silk with these special properties, no one had been able to successfully mass-produce the man-made fiber—until a venture firm formed by a group of young researchers from Keio University came along. The startup utilized the latest biotechnology to enable a different organism to create a protein resembling spider silk. The scientists then collected this protein and processed it into fiber.

The experimental facilities for mass production will be completed in December 2013, and research and development is now being fast-tracked in anticipation of full-scale mass production within a few years.

Tough Fibers Stand the Rigorous Test of Outer Space

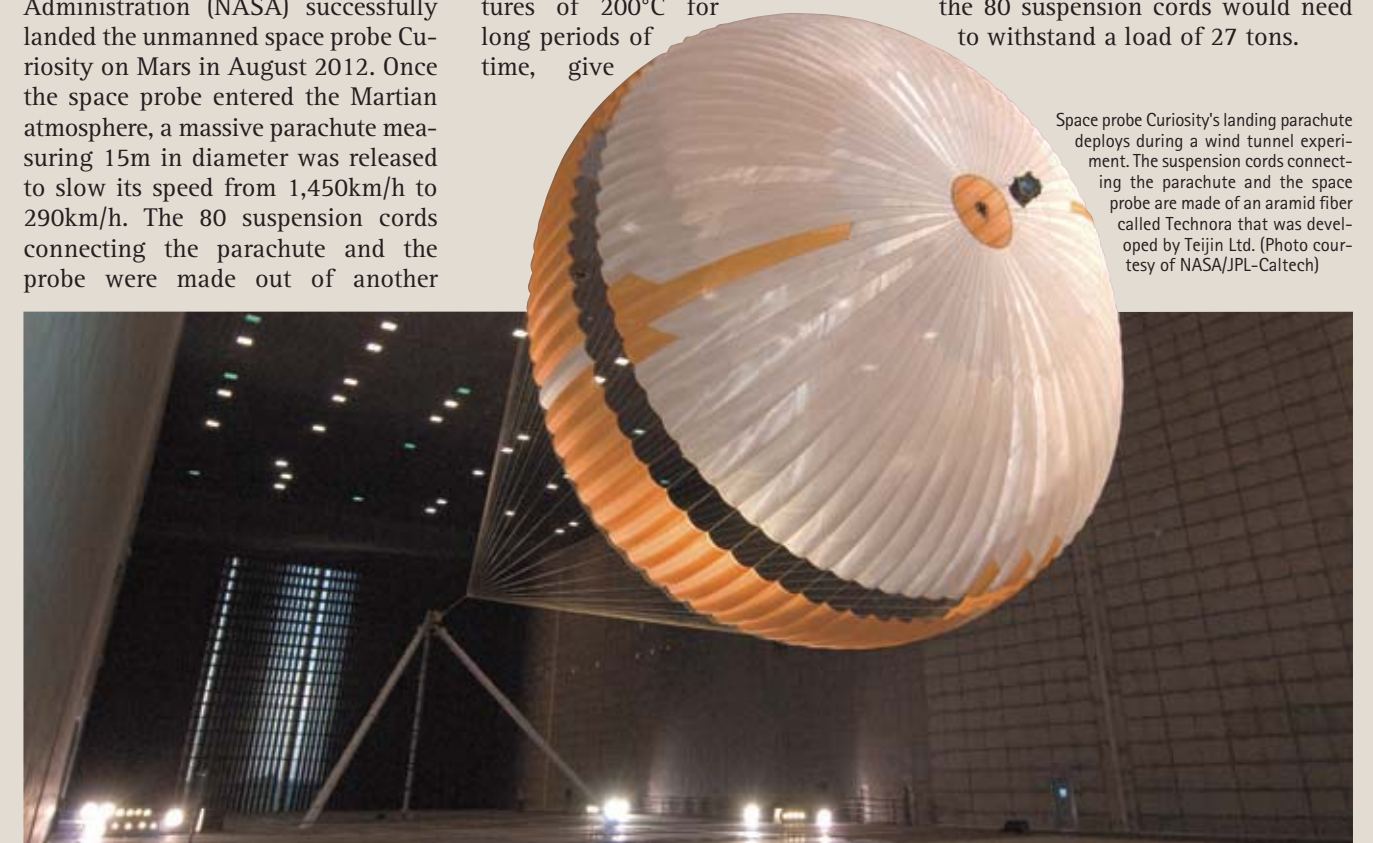
Venturing away from Earth, high-tech textiles travel to outer space.

The National Aeronautics and Space Administration (NASA) successfully landed the unmanned space probe Curiosity on Mars in August 2012. Once the space probe entered the Martian atmosphere, a massive parachute measuring 15m in diameter was released to slow its speed from 1,450km/h to 290km/h. The 80 suspension cords connecting the parachute and the probe were made out of another

extraordinary fiber developed by a Japanese company.

These special aramid fibers have a tensile strength-to-weight ratio eight times greater than steel. This strength, in combination with a heat resistance enabling them to withstand temperatures of 200°C for long periods of time, give

these aramid fibers extraordinary properties that duly impressed the officials at NASA. According to NASA calculations, the parachute would be required to withstand a maximum gravitational pull nine times stronger than that on Earth during landing, and the 80 suspension cords would need to withstand a load of 27 tons.



Space probe Curiosity's landing parachute deploys during a wind tunnel experiment. The suspension cords connecting the parachute and the space probe are made of an aramid fiber called Technora that was developed by Teijin Ltd. (Photo courtesy of NASA/JPL-Caltech)



1. The single *kanji* character at the top, *cha* (tea), is written in bold brushstroke. The other three characters give the name of this tea leaf shop. Hanging under the eave, this *noren* suggests you will be greeted with formality and courtesy inside an old, well-established shop. (Collaboration: Main store of Ippodo Tea Co., Ltd. in Kyoto)
2. *Noren* in front of a candy shop in the ancient city of Kanazawa (Hokuriku region). They catch the eye with their bold lettering. (Photo courtesy of Aflo)
3. *Nobori* banners flap in the breeze in front of the Ryogoku Kokugikan Sumo Stadium in Tokyo, colorfully trumpeting the names of sumo wrestlers. (Photo taken from behind.)
4. Pennants with the *kanji* character for "ice" hang in front of sweet food stalls that sell shaved, syrup-sweetened ice. They are a sure sign of summer. (Photo courtesy of Aflo)

Cloth Signs Add Color to Urban Landscapes

Noren curtains hang above shop doors, advertising the business inside. They are generally made of cotton or hemp, and their message is presented in resist-dyed characters, patterns or illustrations. *Nobori* banners have been used since ancient times, traditionally for festivals, at one time to identify battle arrays, and today to proclaim the names of sumo wrestlers and traditional play actors, and to publicize sales campaigns. Japan's towns and cities have lots of signs like these—all fun to look at, and all made of cloth.

Photos by Takahashi Hitomi

Noren curtains and *nobori* banners add zest to Japan's urban landscapes. *Noren* characters, patterns and illustrations give you an idea of the type of business being advertised, and are an important part of an enterprise's public persona.



Inari-zushi

Sushi rice wrapped in thin slices of deep-fried tofu

Photos: Arai Akiko, Aflo

Collaboration: Ningyo-cho Shinoda-zushi Sohoten Sushi Shop



The fox is represented in statue form at Fushimi Inari Taisha Shrine in Kyoto, and is venerated there.

Deep-fried tofu skin pouches simmered in a sweet and salty broth of soy sauce, sugar and *mirin* (a sweet sake seasoning), then stuffed with sushi rice—this is *inari-zushi*, a cheap food for everyday people that goes by the nickname, O-Inari-san.

Inari is deep-fried tofu (*abura-age*) sliced thin. The word comes from Inari shrines, where the fox has a place of honor. The word's origin is *ine nari* (rice grains forming on the stalk), and in the old days Inari shrines venerated Inari, the god of agriculture. Over time, the shrines focused on the servant of that god, who happened to be a fox. Foxes are said to love deep-fried tofu, and from this came the custom of calling tofu skins *inari*.

In the Kanto region (eastern Japan) the tofu skin pouches are generally square, but in the Kansai region (western Japan), triangular. The sushi rice may be mixed with tiny pieces of simmered lotus root, carrot, or ginger pickled in *ume* plum vinegar.

Inari-zushi became a big seller in Edo (modern-day Tokyo) around the

middle of the 1800s, and the business of a peddler selling this kind of sushi back then would later grow into the reputable shop featured here. The shop's roots go back to 1877, and it is located near traditional theaters in Tokyo's Ningyo-cho district. Members of the audience eat their boxed lunches—perhaps containing *inari-zushi*—between the acts of the play.

Inari-zushi is actually quite difficult to make because deep-fried tofu skin tends to crumble. The shop uses skins that are even thinner than you would find in a market. Thin is good, because only the right amount of broth soaks into the skins, so they will not wet the rice.

The deep-fried tofu pouches are soaked in 50°C water for about 10 minutes to remove excess oil. Next, to make them tastier, they are simmered for two or three minutes in a broth containing three types of sugar, soy sauce and *mirin*. They are left at room temperature for one day, then in a refrigerator for about three days. It takes this amount of time for the

tofu skins to fully absorb the delicious flavor.

After that, the pouches are simmered again, then stuffed with rice that has been seasoned with vinegar, salt and sugar. Expert sushi chefs open one end of the pouch with one hand, use the other to form a ball of seasoned rice without clumping, and fill the pouch gently. One stuffed pouch should weigh about 50 grams.

The shop sells the most *inari-zushi* on Inari shrine festival days. Even today, the roofs of some office buildings in the city have small shrines dedicated to Inari, and on the festival days you will see *inari-zushi* offerings placed there.

Perhaps the reason why this type of sushi goes by the affectionate nickname of O-Inari-san is because even today the Japanese still have a wish in their hearts for a good harvest.



Left: The shop uses deep-fried tofu skins that are thinner than those found in the market, to prevent too much seasoning from soaking in. Center left: The tofu skins are dipped in broth. Center right: Each salty-sweet tofu skin is stuffed with lightly vinegared rice. Right: Ten seconds are all an expert sushi chef needs to fill one tofu skin with rice.



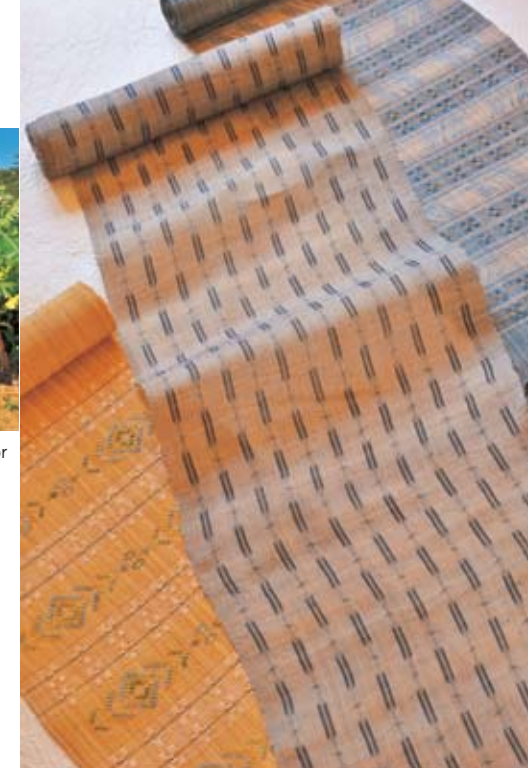


Okinawa, Islands of Cloth

Photos by Ito Chiharu Map by Oguro Kenji
Fabrics crafted on the main Okinawa island. From left, *Shuri-ori*, *Yomitansan hana-ori*, and *Ryukyu gasuri*.
(Collaboration: Ryuka)



Left: Fields of *ito-basho* provide the raw materials for *bashofu*.
Center: *Bashofu* looks as cool as it feels.
Right: *U-hagi*, harvesting the *ito-basho* fibers.



Located at the southwestern tip of Japan, the Okinawa islands are known for tourism and resorts. Blessed with a warm climate year-round that contrasts starkly with the extremes of heat and cold in the rest of the country, the islands are one of Japan's most popular destinations. A lesser-known aspect of Okinawa is its rich tradition of dyeing and weaving. There are many high-quality, light-weight hemp and silk fabrics in Japan, but a culture of light fabrics that are cool to wear is deeply engrained in Okinawa thanks to the region's climate.

Home of traditional *bashofu* cloth, the Kijoka Ogimi-son region is located in the northern part of the main Okinawa island. To those living in hot and humid Okinawa, this light and airy fabric is essential to staying cool. *Bashofu* is woven from the fibers of a large plant called *ito-basho* that looks something like a banana tree. Even today, the process of making *bashofu* cloth involves 23 different steps, all carried out by hand, beginning with planting and

harvesting the *ito-basho*, continuing through the *u-umi* process (joining the stalk fibers to make a continuous length of thread), and finally ending with weaving the cloth. Every part of this process, from the raw materials to the techniques used, is unique to Okinawa.

A skilled *bashofu* artisan, Taira Toshiko is pivotal in today's efforts to revive *bashofu* techniques. She took us through the *u-umi* stage of creating *bashofu*. This stage has a great impact on the texture of the finished cloth and is therefore the process that requires the most highly skilled and experienced artisans. Taira's hands move faster than the eye can see, dividing the *ito-basho* fibers into countless thin threads. This is truly a skill that can only be mastered with many years of experience.

If *bashofu* is the quintessential cloth of Okinawa, *bingata* (literally "red style"), which uses stencils and other methods, is the quintessential dyeing technique on the islands. Sophisticated quality *bingata* fabric was worn by the royal



Left: *U-umi*, making thread from *ito-basho* fibers.
Center: Taira Toshiko has been a central figure in passing on *bashofu* techniques to revive this tradition.
Upper right: Rolls of dried fibers called *chingu* ready to be made into thread.
Lower right: Weaving *bashofu*.





Left: Colorful *bingata* kimono.
Below: Stencil used in *bingata* dyeing.

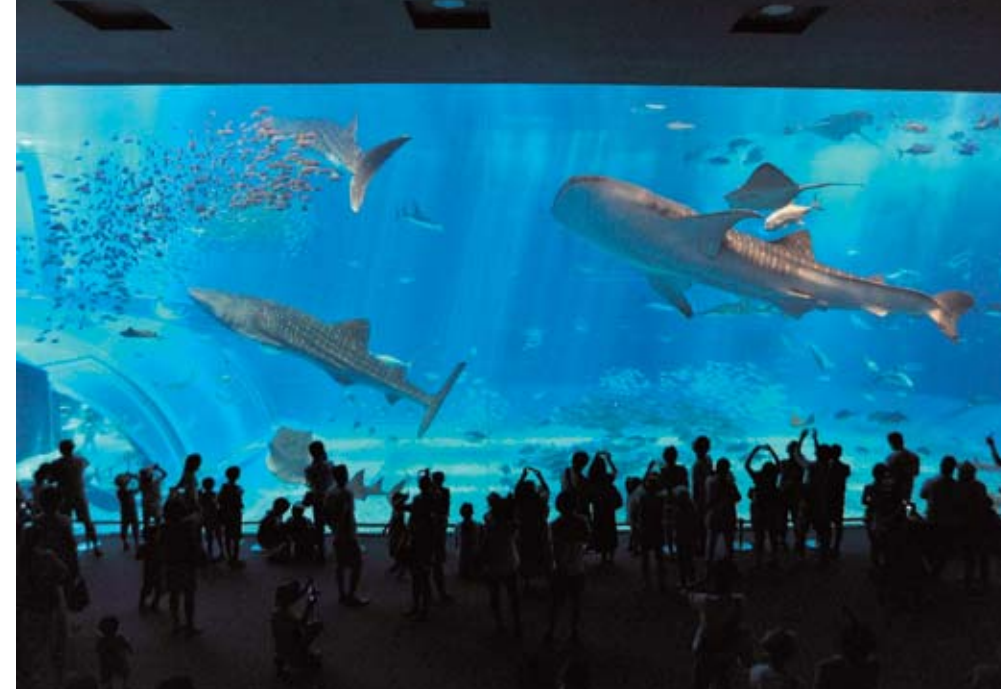


Left: After the first painting, additional color is applied in the re-painting process. This second painting increases the vibrancy of the color to create a sense of translucence through the rubbing of natural dye into the cloth.
Right: Isagawa Yoko, a leading *bingata* artisan working today.

family of Ryukyu, who ruled Okinawa at one time. The vivid *bingata* hues are achieved with an initial painting (shading) followed by a re-painting step that involves rubbing the paint into the cloth and then a second dyeing with natural dyes.

Colorfully dyed *bingata* fabric embodies the dazzling Okinawan sun beautifully. The bright sunlight and infinitely blue sea are Okinawa's great points of appeal. The idyllic beaches of this southern climate invite visitors to swim and scuba dive in the sea. A trip to the lively Okinawa Churaumi Aquarium offers a great chance to marvel at massive whale sharks, manta rays, and other creatures of the Pacific Ocean and the Okinawan sea. Take in the splendor of the former Ryukyu Kingdom with a visit to spots of historic interest such as Shuri Castle, a World Heritage site.

A trip to Okinawa offers the ideal combination of seaside recreation, sightseeing, and the fascination of traditional textile arts.



Left: The massive water tank of whale sharks is especially popular at the Okinawa Churaumi Aquarium.
Right: Shuri Castle testifies to the splendor of the Ryukyu Kingdom, which once ruled Okinawa.



Okinawa cuisine has a special appeal all its own. Popular dishes include Okinawa soba, a noodle dish said to have the same origins as ramen; *chanpuru*, a stir-fry of vegetables and tofu; and *awamori*, a *shochu* liquor whose flavor deepens as it ages.



One of Japan's top resort areas, Okinawa offers spectacular vistas of blue sea as far as the eye can see.



Getting there

Take the limousine bus from Narita Airport to Haneda Airport (approx. 80 minutes), then fly from Haneda Airport to Naha Airport (150 minutes).

Alternatively, fly from Narita Airport to Naha Airport (3 hours).

Ogimi-son Bashofu Studio (Ogimi-son Bashofu Orimono Kobo) is a 150-minute drive from Naha Airport.

For more info

Okinawa Tourist Information Web Site: "Okinawa Story" (English, Chinese, Korean, French, German, Russian, Spanish, Portuguese)
<http://www.okinawastory.jp/en/>



Furoshiki Cloth for Wrapping Things

Photo by Ito Chiharu Collaboration: Musubi

A *furoshiki* is a square piece of cloth. It has been used for centuries in Japan to make a kind of bag for carrying or storing important objects. It makes it easy to carry things of just about any shape, any way you want.

Furoshiki cloths come in a wide variety of designs, from a traditional focus on some aspect of nature or pattern, to the modern liking for something cute.

They are generally made of cotton, silk or polyester and others, and they come in different sizes, so some can be used as scarves, others even as tablecloths.

When you are not using your *furoshiki*, it folds up small so you can carry it around for when you need it. And it offers more than convenience—you can use it time after time as an eco-friendly shopping bag. No wonder the popularity of *furoshiki* is growing.