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The Japanese book: paper, colour and lustre

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AS RECOUNTED in the *Nihon shoki*, one of the oldest chronicles of Japan (compiled in 720), a Buddhist monk named Tamjing arrived in Japan from Koguryō, a kingdom of the Korean peninsula, in the spring of 610. He was described as a scholar, well-versed in the five Confucian classics, but also as a craftsman expert in papermaking and the preparation of colours. Whether it be truth or myth, the brief passage in the *Nihon shoki* suggests that knowledge of how to produce paper, and colours, reached Japan from the continent well before the early eighth century. It has shaped textual and pictorial artefacts ever since.¹

This chapter casts light on the technical aspects that have contributed to the making of printed books and manuscripts, whilst looking at examples from the Bodleian Japanese collection. It considers closely the distinctive characteristics and methods of production of paper and colours, from the raw ingredients selected to the skills involved (FIG. 46).

PAPER

Washi (handmade Japanese paper) is closely associated with bookmaking – either used as a substrate

for text and images, or turned into a protective cover. Yet this flexible, strong, light and translucent material has many other applications, fully permeating Japanese daily life, from wrapping to making lanterns, fans, umbrellas, kites, dolls, garments, paintings and even elements for interior design in traditional houses.

Ever since *washi* reached Europe in the seventeenth century – through Dutch merchants, Jesuit missionaries from the Iberian Peninsula, and English merchants from the East India Company – its visual and material qualities have captured the attention of Europeans. For example, the English diarist John Evelyn (1620–1706), on 22 June 1664, wrote about the thin and polished paper of amber colour shown to him by a Jesuit missionary, together with other rarities from China and Japan.² The Dutch artist Rembrandt (1606–1669) experimented with Japanese paper to print some of his etchings and, later in the eighteenth century, the German naturalist Engelbert Kaempfer (1651–1716) wrote the first accurate account on Japanese paper and its manufacture, published in his *Amoenitatum Exoticarum* (1712) and posthumously

in his *History of Japan* (1727, fig. 47).³ Largely relying on Kaempfer's work, another medical officer at the Dutch East India Company's trading post in Nagasaki, the Swedish naturalist Carl Peter Thunberg (1743–1828), described Japanese papermaking in his *Flora Japonica* (1784).⁴

The European attraction to Japanese paper carried on in the nineteenth century. In 1869, the British prime minister William Gladstone prompted Sir Harry Smith Parkes, then ambassador to Japan, to investigate the state of the craft. The outcome was an extensive report, with paper names, manufacturing districts, uses, sizes, prices and actual specimens, which is now divided

between the Victoria and Albert Museum, London, and the Royal Botanic Gardens, Kew.⁵ Parkes's study is a remarkable record of *washi* technology, fortuitously assembled at a critical time. Soon afterwards, in the mid-1870s, the first mill producing machine-made paper opened the way to the industrialization of papermaking in Japan. Nowadays the old papermaking traditions, passed from one generation to the next, only survive in a few locations.

Papermaking had been practised in many provinces across Japan since the eighth century, and it became a government's concern around 807 with the establishment of a paper mill in the south

of the imperial capital Kyoto. For a long time, paper was an expensive commodity produced for limited consumption, used primarily within the court and temple environments for Buddhist scriptures and bureaucratic documents, for example. It was not until the early modern period (the seventeenth to the nineteenth centuries) that *washi* became a more widely available commercial commodity, thanks to the establishment of numerous paper mills across the country and various retailers in large urban centres. For instance, shops directories such as *Edo kaimono hitori annai* (1824), a guidebook to shopping in Edo, listed an array of retailers and wholesalers specializing in paper for different

purposes such as writing, calligraphic work, painting and printing.

Washi comes in many different sizes, textures and physical properties, depending on the fibres and treatments used in the production process. In the Japanese–Portuguese dictionary *Vocabulario da lingoa de Iapam*, published by the Jesuit mission in Nagasaki in 1603–04, we read entries about a broad range of Japanese papers which are still used today.

A much more extensive list of paper products can be seen in a printed advertisement, possibly late nineteenth century, for the Murata shop in Shin Yoshiwara which lists over forty different

46 LEFT TO RIGHT A set of flexible screens from a papermaking mould, the intact bark of *mitsumata* and its white inner layer after cleaning, sheets of *washi* rolled together



47 OVERLEAF Illustration of the *kōzo* plant, from Engelbert Kaempfer's *History of Japan*, 1728 (first published 1727). Douce K 138.

Kaadsj Kadsira.



*Papyrus procumbens lac affcens folio
longo lanceato, coriaceo chartaceo
viridi*

*Papyrus fructu Mori
Celfa
Papyrus legitima
Paper Tree.*



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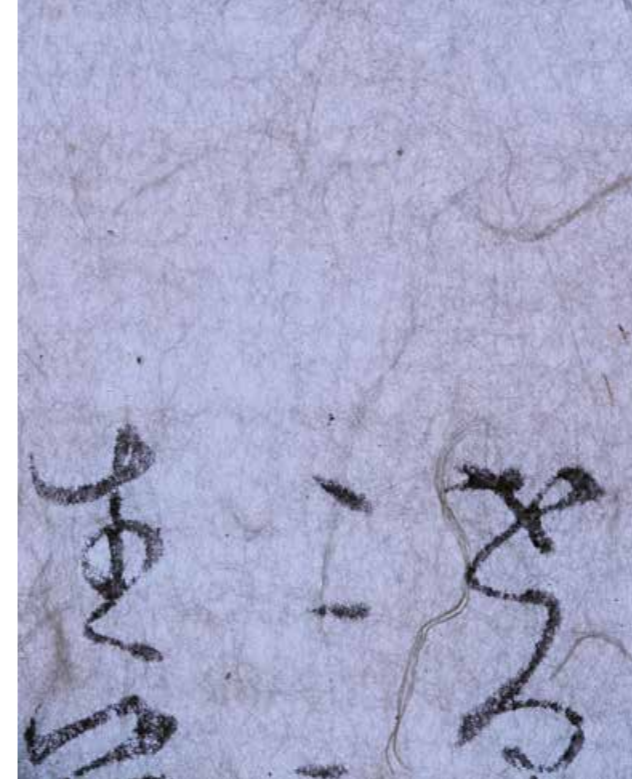


48 Printed advertisement for the Murata shop in Shin Yoshiwara, owned by Ebiya Yoshichi. Possibly late nineteenth century. Over forty different types of paper are listed here. Nipponica 1004.

types of paper, including regional varieties of *washi* and imported products from China (FIG. 48). This document provides us with invaluable information about papers and stationery that were commercially available in Japan during the latter part of the

nineteenth century, for example *hōsho*, originating from Echizen, *danshi*, and *sugiharagami* named after Sugihara, Hyogo Prefecture.

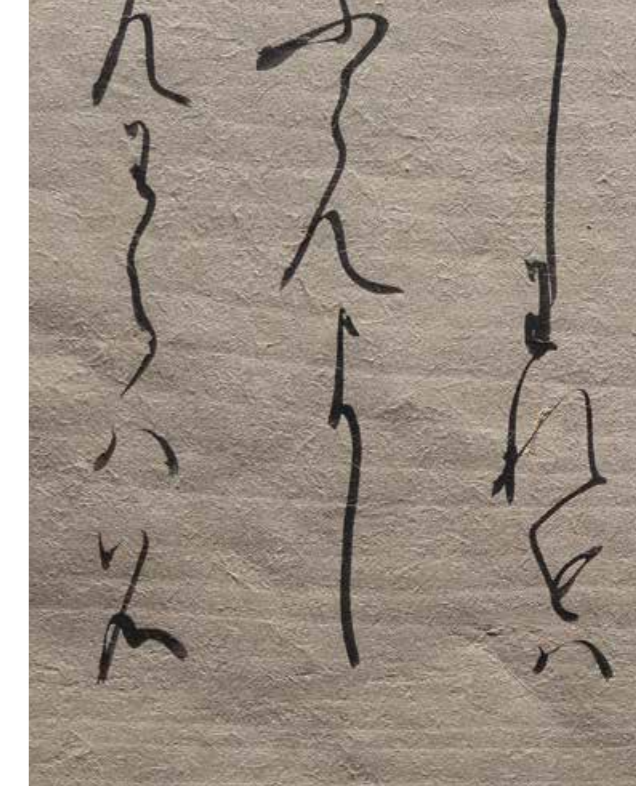
Since the eighth century, the most common types of papers used for writing, book production and graphic art were made using an array of locally sourced fibres extracted from *asa* (hemp, or *Cannabis sativa*), *kōzo* (mulberry plants such as *Broussonetia papyrifera* or *Broussonetia kazinoki*) and *gampi* (plants such as *Wikstroemia sikokiana*).



49 Detail of the paper used for *Yashima*, a seventeenth-century book for chanting, one of the first Japanese publications to reach the Bodleian (see FIG. 17). Observed under transmitted light, the network of long bast fibres and the occasional thick strands is typical of Japanese paper. Nipponica 131–133.

Paper produced with the *mitsumata* plant (*Edgeworthia chrysantha*) was introduced much later, at the end of the sixteenth century.

Ordinary types of *kōzo* paper include *Minogami*, made in a variety of thicknesses in the Mino region, and *hanshi*, denoting a paper of small dimensions measuring half the size of other common papers, manufactured in nearly every province from Chikugo to Sekishū and Tosa. *Danshi* and *hōsho* stand out among the prestigious *kōzo* papers. The first is a beautiful paper of considerable thickness, produced in the provinces



50 Detail of the paper used in a painted manuscript entitled *Ibuki*, c. seventeenth century. It has the smooth texture and opacity typical of *maniai* paper, made at the time with *gampi* fibres and coloured clay from the Najio area. Woodgrain marks from the board against which the paper dried are evident. MS. Jap. d.31.

with a finely wrinkled texture, and the second is a thick and strong paper with a smooth texture produced initially in Echizen and later across the country. *Hōsho* in particular is selected by *ukiyo-e* woodblock printers because it tolerates the repeated friction and rubbing required to produce colourful prints. At the same time, its soft surface is ideal to obtain striking reliefs and impressions; it remains a favourite of artists across the world.

Papers made with *gampi*, such as *torinoko*, are distinguished by a shimmering appearance and smooth texture. *Torinoko* generally has a very

uniform surface, as during its making a piece of silk gauze is laid over the papermaking screen. With its exceptional qualities and range, it became the paper of choice amongst the upper classes and famous artists. Another type of *gampi* paper is *maniai*, manufactured in Najio, Hyogo Prefecture, with the addition of local clay of different colours (FIG. 50). *Maniai* paper presents a distinctive opacity as well as a matt and smooth surface, and was often used for painted manuscripts such as the *Nara e-hon* (see chapter 2).

Despite all these varieties, the basic process of producing paper remained mostly unchanged over the centuries.⁶ A number of Japanese primary sources have been used to study the traditional process to produce *washi* and describe the various types of paper. The *Engi shiki* (927), a collection of norms regulating court life, religious ceremonies and the work of the government, includes a full account of the imperial paper mill and other local papers.⁷ Before botanists and agronomists began to take the lead in the study of this subject, valuable information about paper and papermaking is often part of diaries, dictionaries and encyclopaedias.⁸ The *Yōshū fushi* (1686), a topographical compendium of Yamashiro Province written by physician Doyu Kurokawa, describes the origin and manufacture of papers made in that province. The first book devoted exclusively to the subject of paper is Kimura Seichiku's *Shifu* (1777), a 'record of papers' which provides exhaustive information concerning the range of papers available at the time. It was followed by *Kamisuki Taigai* (1784), an overview of papermaking by Morihide Nyudo Shuken Kizaki. This illustrated scroll, discovered only in 1940, covers aspects from the figure of the

itinerant papermaker to the advantages of mixing *gampi* and *kōzo*. Subsequently *Kamisuki Chohoki*, a guide to papermaking by wholesale paper dealer Kunisaki Jihei, was published in Osaka in 1798. It describes the manufacture of *Sekishū hanshi* in the Shimane Prefecture, and it is printed on this type of paper. The book's pictures of hard labour show playful details, such as a baby asking his tireless mother 'steam some *mochi* for me to eat instead of steaming *kōzo*'.⁹

From the outset, papermaking was practiced from home, often by small-scale farmers during the winter months between the harvesting and the planting seasons, thriving in mountain villages with an abundance of plant fibres and running water. The main fibres used were extracted from hemp, *kōzo*, *gampi*, *mitsumata* and other local plants, which once grew plentifully throughout Japan. The period for papermaking differs slightly according to the geographical area – it usually starts in late November and ends in April. During the winter, the stems of *kōzo* and *mitsumata* are cut back, gathered into bundles to be transported down the mountains, and steamed in large cauldrons of water for a couple of hours; this process enables the removal of the bark from the wooden centre of the stem. The bark is then hung to dry in the winter sun and stored. At this stage the bark is known as black bark (*kuro-kawa*), consisting of a black outer layer, a green middle layer and the white inner layer known as white bark (*shiro-kawa*). The stems of *gampi*, conversely, are cut back in early summer and the bark is immediately stripped with a sickle.

The dried bark is soaked and softened for a day in water, traditionally the river. For the finest papers, the two outer layers are then scraped off



with a sharp knife. The remaining white inner layer is rinsed thoroughly in the stream before being dried and bleached in the sun. The white bark is then cooked with lye, a potassium-rich alkali made from wood ash, to remove the unwanted non-cellulosic material and to soften the fibres so that they can be separated into strands. The fibres are then thoroughly rinsed of the alkali and stream-bleached. Snow-bleaching and sun-bleaching are the other two methods used which make the most of the surrounding environment. The preparation of the fibres continues in a tank

51 *Kōzo* fibres being cleaned by hand in water. Photograph by Karmen Corak from *Washi, la via tradizionale*, 2010–11. This series of digital photographs was printed on Japanese paper made by Hayashi Shinji in Kurotani, Japan.

of water with the removal by hand of all remaining specks and imperfections (FIG. 51). The clean fibres are squeezed into the shape of a ball and hand-beaten with a wooden rod or a mallet to separate and soften them, preserving intact their long and slender shape that characterizes Japanese

Once the fibres have been mixed with water, making a pulp, the sheet of paper is formed using one of two different methods. The first is *tamezuki* (the accumulation method). Here the pulp is scooped up only once and then strained through the screen, producing thicker papers. Thought to have been introduced to Japan first, this method originated in China and travelled to the rest of the world from Samarkand to Fabriano and Philadelphia. When observed through transmitted light, examples of paper from the Nara period (710–794) to the Heian period (794–1185), even though they present different characteristics and technical standards, usually have a random fibre distribution. This indicates that they were made with the *tamezuki* method.

The second method is *nagashizuki* (the flowing method), which was probably developed at the Kamiyain paper mill set up by the government of Kyoto in 807. In this case, the process starts with *neri* (mucilage), a thick viscous substance obtained from the root of *Hibiscus manihot* – known as *tororo aoi* – or from the bark of the *Hydrangea paniculata* – known as *nori utsugi*. It is added to the vat to maintain the fibres in suspension and to slow the speed of drainage, which is essential when forming uniform and thin, sometimes almost transparent, sheets. The mould is dipped into the vat several times, and the pulp is scooped up and shaken repeatedly back and forth and from side to side until the sheet becomes uniform and excess solution is thrown off. At every successive dip the sheet of paper is slowly laminated, becoming thicker with a predominant fibre orientation along the chain lines, according to the fibres' flow and the screen motion at the time of papermaking.¹⁰

The sheets of paper are laid down on a board one after the other. The pile is progressively pressed, then each sheet is peeled off and brushed gently onto wooden boards to dry outdoors. Once the sheet is dry the side that was placed against the board will have a smooth surface with a wood grain pattern, whilst the exposed side will be rough and may bear faint brush marks. With the increasing use of heated metal boards, the surface of the paper started to lack this quality.

The main stages of papermaking are the subject matter of *Kami o tsukuru hitotachi* by the artist Serizawa Keisuke (1895–1984), a book published in 1950 as a limited edition of fifty copies. Serizawa was part of the *Mingei* movement, which began in the 1920s to highlight the value of traditional crafts. Serizawa played a leading role in the revival of stencil dyeing (*katazome-e*), which he used in this book's six powerful illustrations. Papermaking is a recurrent theme in his work, showing his admiration for this craft while acknowledging its place in the Japanese cultural landscape.

Another figure associated with the revival of handmade Japanese paper was Seikichiro Goto (1898–1989). Goto practised papermaking and travelled extensively across the country to study this craft. The results of his journeys and research are described in *Kami no Tabi*, a comprehensive book with coloured stencil illustrations (*katazome-e*) and samples of Japanese paper, published in 1964 in a limited edition of 300 copies (FIG. 52).

In recent times the Japanese government has recognized the production of a number of papers as 'intangible cultural heritage' (to use UNESCO terminology), and has designated as its skill holders, or Living National Treasures, the

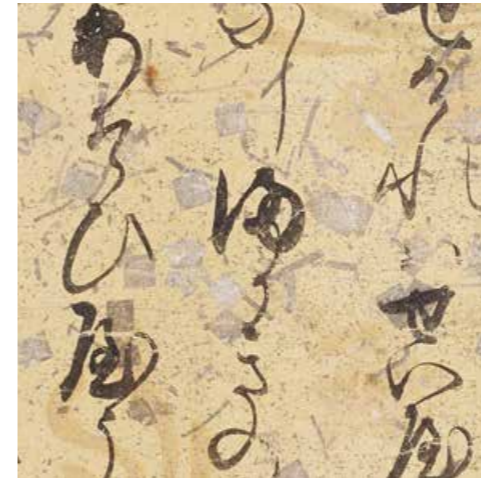
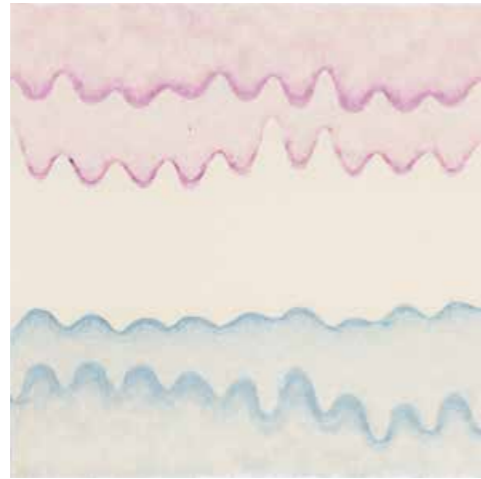


53 Papermaking at Izumo Mingeishi, Izumo, Japan, March 2023.

papermakers who have given new energy to the transmission of this craft. For example, the late Living National Treasure Eishirō Abe (1902–1984) received broad recognition for his *gampi* paper, and his mill Izumo Mingeishi in the Shimane Prefecture continues to produce paper using his methods (FIG. 53). Like Serizawa, he was also part of the *Mingei* movement,¹¹ creating folk art papers and bringing back the colourful *kumogami*, a cloud-patterned paper used for writing. A range of samples of Abe's *gampi* paper are included in the *Mingei's* magazine *Kogei*, in a 1933 issue dedicated to the topic of *washi*.¹² Japanese hand papermaking has continued to create papers of

exceptional qualities and long-term stability. In 2014 the production of *Sekishū hanshi*, *Minogami* and *Hosokawashi* has been recognized as intangible cultural heritage of humanity by UNESCO.

The appearance and properties of paper can be modified through simple treatments or elaborate processes. Burnishing or hammering the paper's surface increases the density of the sheet, giving it a smooth and glossy texture on which it is not only easier to write but ink is prevented from bleeding. A similar surface texture is obtained by coating paper with a solution of glue sizing, which reduces its porosity. Beyond these basic methods, a wide range of original techniques was developed to



54 Details showcasing a range of techniques commonly used for dyeing and decorating paper. LEFT TO RIGHT (a) *konshi*, a paper dyed with indigo by immersion, (b) a marbled cloud-pattern paper, (c) a pattern obtained by crumpling a paper coated with paint, (d) scattered flecks of silver leaf of different shapes and sizes seen under calligraphic work, (e) a lustrous pattern obtained by rubbing gilded paper against a woodblock, (f) decorations painted in gold seen under calligraphic work. MS. Jap. d.30-50; Woudhuiysen b. 13; Nipponica 1001; MS. Jap. c.4 (R); MS. Jap. d.30-50; MS. Jap. c.8 (R).

produce attractive papers which were in demand for writing poetry, for endpapers, book covers and other applications.

Noteworthy dyeing and decorative methods can be identified across the Bodleian Japanese collection (FIG. 54). Examining these examples of paper brings to life the skills at play. Sometime the fibres are dyed before they are made into paper. Other times the paper surface is dyed by brush,

either uniformly with barely visible brush strokes or with prominent brush strokes obtained with dented brushes, which are deliberately used to form simple patterns from stripes to grids. Paper can also be dyed by blowing colours on it, or by immersing the paper sheets in a dye solution. A typical example of the last practice is *konshi*, a strong and durable dark indigo blue paper, produced since the Heian period for copying sutras with gold ink (FIG. 54a). Through a sequence of carefully timed immersions in the indigo dye, the paper reaches the desired shade. After being rinsed and dried it can be coated with a mixture of alum and glue sizing, or beaten with a mallet or polished with a shell to give it a smooth and glossy surface. Further dyeing methods include stencil dyeing and *suminagashi*, a marbling technique where patterns formed by ink flowing on water are transferred onto fine papers such as *hōsho* or *torinoko*.

More intricate techniques are found adorning papers used for calligraphy and copying.

Distinctive patterns were obtained by adding dyed fibres to a newly formed sheet in many ways. Fibres coloured mostly in indigo or purple were laid at the top and bottom of a newly formed sheet of paper, or tossed onto it to form cloud patterns. A marbled cloud design was obtained by dipping the bottom edge of the mould with a newly formed sheet of paper into a vat of coloured fibres, and repeating this process several times (FIG. 54b). A pattern resembling drops of water was the result of flicking a leaf dipped into water over a wet sheet of paper; the drops form shallow holes on the sheet just deep enough to create a decoration.

Wrinkled papers were also in demand, ranging from *momigami* (a thick, good-quality *kōzo* paper repeatedly crumpled by hand) to paper coated with opaque pigments and crumpled to obtain a crackle design, used primarily as covers for books (FIG. 4.9c). The aforementioned *danshi* is a paper with a finely wrinkled surface, with the thickest being the most wrinkled to the thinnest having slight

creases, made by pressing a number of wet *kōzo* papers on top of one another and then lifting them together at an acute angle while still slightly wet.

Precious metals were added to make elegant papers with shimmering effects. Gold and silver, transformed into powder, flakes or thin square leaves, were respectively sprinkled, scattered or applied to paper prepared with glue (FIG. 54d). Paper was coated with a layer of paint made with either mica or *gofun*, a white pigment from oyster shells, often mixed with other pigments to create muted colours. Gilded or coloured papers were at times further decorated using wood blocks either to print or emboss patterns. Extraordinary lustrous patterns were realized by rubbing gilded or coloured papers against carved woodblocks with an animal tusk (FIG. 54e). The paper used to write or cover luxury books was often decorated with motifs such as birds and plants painted in gold and silver (FIG. 54f). The ways to embellish paper through colours and textures were countless.¹³



55 A page from *The Tale of Akimichi*, eighteenth-century manuscript. The pigments identified here are: carbon for the black, smalt or indigo for the blue, vermilion for the red, red lead for the orange, *gofun* for the white, malachite for the green, organic red mixed with *gofun* for the pink, and others. A delicate layer of gold paint has been applied over the ground, whilst the clouds in the foreground are executed with scattered flecks of gold leaf. MS. Jap. d. 65.

COLOUR AND LUSTRE

Colours are created by transforming raw ingredients into paint. They have either been extracted from natural sources – from roots to flowers, from insects to sea shells, from precious minerals to natural earths – or have been artificially made, and occasionally discovered by chance, during scientific experiments. The introduction and use of pigments in Japan is described in early chronicles such as the *Nihon shoki*, the aforementioned history of Japan written in the eighth century where facts and mythology merge. Historical records indicate that most pigments were made in Japan, but they were also procured from China and later Europe.¹⁴

Any desired colour can be obtained with a wide range of rare or familiar pigments (FIG. 55). It can be the result of a single unadulterated pigment, or of mixtures of pigments. For example, blue indigo and gamboge were combined to make green. More intriguingly, pigments of the same colour, such as indigo and Prussian blue, were mixed to obtain the right hue of blue or for economic reasons. Colours that look very similar to the eye can be obtained using very different ingredients – the only way to know their composition with certainty is by scientific investigation. In recent years, the development of scientific methods to identify pigments with great accuracy has provided information of invaluable assistance to the study of pigments found in Japanese books. Complementary analysis has helped to ascertain the artists' preferences or simply what was available to them when creating the work, as well as to establish whether any colour alteration has occurred over time since the work's execution. The results of the analysis are often the only resource, as historical

records illustrating the use of colours are scarce or inadequate to provide an accurate overview of pigments used at a specific time and place. Selected areas of the paint layer from books in the Bodleian Japanese collection have been analysed to illustrate the characteristics of most of the pigments described below.¹⁵

The quality of the raw materials sourced, the method perfected to create the pigment, as well as the dimension and shape of the pigment's particles, all determine the appearance and ultimately stability of the paint layer. For example, a paint with fine pigment particles penetrates through the fibres of the paper substrate and tends to be far more stable than one with coarse particles. Even though pigments are the main components of the paint layer, there are other factors which play a significant part in its appearance and stability, such as the amount of binder present, the modes of application, the type of paper support and how the paint penetrates into it.

The colour red is obtained from a variety of inorganic and organic materials (FIG. 56). Mellow red pigments, varying in hues and shades, have been made by grinding and refining natural earths coloured by iron oxide. A vigorous red is reached with vermilion obtained directly from the mineral cinnabar, or by recombining artificially, at a high temperature, the cinnabar's main constituent elements – mercury and sulphur. However, within the pages of a book this pigment can darken and reconvert into the black form of mercuric sulphide. Even though deposits of cinnabar are found across Japan, the best vermilion was imported from China. Another source of inorganic red was red lead. Made by heating lead white pigment or



metallic lead, this vibrant red is sometime found discoloured to a dark brown or a silver grey.

The contrast in appearance between vermilion and red lead can be observed on the figure in a bright red robe on a page of *The Tale of Akimichi*, an eighteenth-century illustrated manuscript lavishly painted with thick pigments and gold. The robe is executed with a uniform layer of vermilion embellished by outlines in gold and carbon and a protruding floral pattern in red lead paint (FIG. 57). In this case the red lead contains lead monoxide massicot, a dull yellow pigment most likely formed during the roasting process whilst making red lead. Observing the floral pattern, the coarser particles of massicot stand out within the smooth consistency of the red lead paint.

56 Sources of red and yellow colours. FROM TOP Cinnabar mineral, madder roots, cochineal insects and derived carmine lake pigment, a dry safflower head and petals, gamboge yellow pigment from tree resin, orpiment mineral and turmeric rhizomes.



57 Detail from *The Tale of Akimichi*, eighteenth-century manuscript. The robe is painted in vermilion, while the protruding flower pattern is executed in red lead containing massicot, a dull yellow pigment. MS. Jap. d. 65.

A diversity of rich reds derives from organic sources. Vast amounts of petals from the bright orange flowers of the safflower (*Carthamus tinctorius L.*) are collected, dried and crushed to create expensive reds. First the petals are rinsed with water to remove the yellow colorant, then they are treated with a solution of alkaline ash to extract the red colorant carthamin, and finally an acid is added to precipitate the colorant into a beautiful red powder. An important region of production of safflower in Japan is the Mogami River valley

of Yamagata Prefecture. Other organic sources of red are concealed in the roots of Japanese madder (*Rubia akane Nakai*), and the following two scale insects known since the late Edo period: the lac insect (*Laccifer lacca*), imported from India and Southeast Asia which produces a resinous pigment, and the desiccated bodies of the female cochineal (*Dactylopius coccus*), native to Mesoamerica and yielding carmine. Carmine was first imported into Europe in the sixteenth century, later reaching China and Japan. Its crimson red colour was a suitable alternative to safflower red, and by 1869 it had largely replaced it, having become readily available at increasingly lower costs. Analysis shows that reds are often the result of admixtures containing any of the aforementioned red pigments.

In Europe, besides the traditional sources of red, an astounding range of red and violet dyes were synthesized from coal tar, following the accidental invention of mauve in 1856. These bright 'aniline colours' were gradually introduced to the Japanese market, probably by foreign merchants in Yokohama. Their use coexisted with most of the traditional colorants of the late Edo period, with the exception of safflower and dayflower blue, both of which proved unstable and prone to fading.¹⁶ These modern synthetic colours were transforming the artist's palette not only in Japan but across the world.

An important source of yellow colour is a toxic and glittery pigment obtained by grinding orpiment, an arsenic sulphide mineral occurring most commonly near hot spring sites. During the late Edo period and the early Meiji period, synthetic arsenic sulphide pigments were most likely manufactured in Japan and, probably due

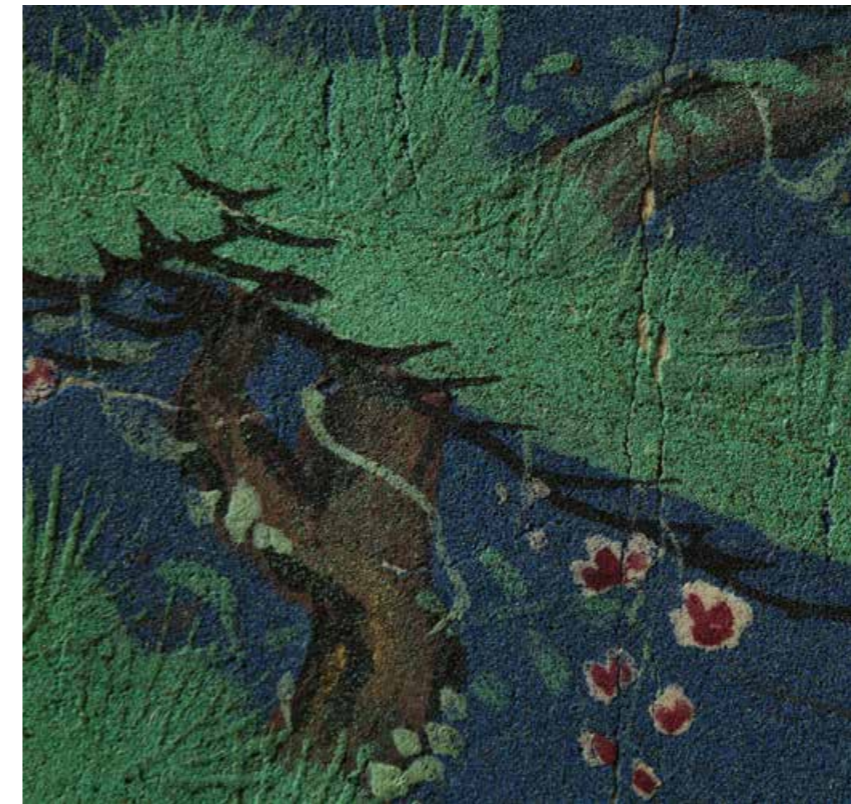


58 Sources of blue and green colours. FROM TOP Lumps of azurite mineral, pressed indigo cakes, artificially made smalt, malachite mineral, coarsely and finely ground azurite pigment, coarsely and finely ground malachite pigment.



to their low price and easy availability, were commonly used in woodblock printing or for book covers.¹⁷ Other sources of bright yellow are the following two pigments: turmeric, obtained from the orange-yellow rhizomes of the plant *Curcuma longa L.*, which is cultivated in most tropical and subtropical countries, and gamboge, an imported gum resin obtained from the trees of the *Garcinia* species growing throughout South and Southeast Asia. The latex exuding from incisions in the bark of these trees solidifies in brittle lumps, which give a transparent golden colour. Occasionally, natural yellow earths are also used.

The predominant source of green is the pigment from the semi-precious stone malachite, a basic copper carbonate found in several locations in Japan (FIG. 58). Like most mineral pigments it is prepared by pounding, grinding, sieving, washing



59 Detail from *The Tale of Urashima*, seventeenth-century painted handscroll. Both the azurite used to paint the river and the malachite used for the Japanese pines have a granular texture. The coarseness of these two pigments complements the sheen of the red flowers, painted in an organic red glaze of fine particles. MS. Jap. c.4 (r).

away any impurities, and grading. During the last process, also known as ‘levigation’, the ground pigment is dispersed in water with the larger heavier particles settling first and the finest remaining in suspension the longest. In this way the pigment can be separated by particle size, from coarser to finer grades, obtaining different textures and a variety of shades – the more finely ground

material being lighter in colour. Malachite, as with other copper-based pigments, is a well-known cause of degradation and brown discolouration of the paper substrate. Other common greens are obtained, as mentioned, by mixing indigo blue and yellow pigments.

A familiar blue colour is prepared from selected lumps of the basic copper carbonate mineral azurite in the same way as malachite – by grinding, washing and levigation. Coarsely ground azurite gives a dark blue whilst the lighter shades are obtained by the finely ground pigment. Azurite is found in deposits across Japan together with malachite. The painted panels in *The Tale of Urashima* (FIG. 59) make abundant use of various grades of azurite from dark to light blue, which complement the grades of malachite.

The petals of the Asiatic dayflower (*Commelina communis*) yield a moisture-sensitive blue. This rare colourant is stored in the form of dyed pieces of paper.¹⁸ Another organic source of blue, with far-reaching applications, is indigo. It is obtained from several species of plants, of which dyer’s knotweed (*Persicaria tinctoria*) is indigenous to Japan. As attested by objects amongst the thousands of artefacts stored in the *Shōsōin* repository, it was used in Japan at least since the eighth century. Since the Edo period or earlier, the area around the stream of the Yoshino River and the town of Mima, in the Tokushima Prefecture of Shikoku Island, has been an important centre of indigo production. Today only a small number of traditional workshops still remain. The leaves of the indigo plant are treated with a protracted fermentation process by keeping them wet in large heaps and regularly turning them over. The fermented material is mixed with

alkaline ash for further fermentation, and after three months the indigo colourant is ready.

An artificially made blue pigment derives from coarsely ground smalt, a potassium-rich glass, coloured blue by the incorporation of cobalt oxide during manufacture. A modern synthetic source of deep blue is Prussian blue, which was inadvertently discovered in Berlin in 1704. This ferric ferrocyanide blue spread rapidly throughout the world. Imported by Dutch and Chinese traders, it was increasingly available in Japan after the 1820s when it started to become a dominant colour for Japanese woodblock printing.¹⁹

The main source of black is *sumi*, a carbon ink composed of fine soot and animal glue. Two kinds of carbon black ink have been produced – one

made from burning pinewood, and the other from burning vegetable oil. The latter has been produced for centuries in various workshops, many of which were located in the Nara area. In sheltered rooms workers tend earthenware pots burning vegetable oil, and remove the soot that forms on the lids (FIG. 60). The soot is then kneaded together with animal glue and fragrant spices and essences, and pressed into decorative wood moulds. The solid ink is gradually dried over many months, first in wood ash and then hanging indoors (FIG. 61). Finally, it is washed, coated with glaze, scorched with charcoal, polished with a clam shell, and decorated. Carbon black is a ubiquitous pigment found in books, prints and paintings. *Ukiyo-e* artists used this pigment of very fine particles for the rendition of



60 Earthenware pots burning vegetable oil, to generate soot on the pot lids from which ink sticks are made. Kobaien Nara, Japan, March 2023.



61 Ink sticks hanging indoors to dry. Kobaien, Nara, Japan, March 2023.



62 Detail from an album of *ukiyo-e* prints, Nipponica 372. The thick paper substrate, with its smooth surface, is possibly *hōsho*. Special woodblocks were prepared to emboss the paper. This technique, known as ‘blind printing’, was used to create three-dimensional effects which here emphasize the actor’s hairstyle, forehead and woven headband. A special block was also employed to polish the carbon black paint layer of the hairstyle to obtain the juxtaposition of a matt and glossy finish.

delicate details, or for staggering effects such as in this image from an album of prints, Nipponica 372 (FIG. 62).

Early sources of white colour are white clay and the noxious lead-based whites. The conventional lead white pigment is artificially made by exposing metallic lead to acetic acid vapour, produced by heating up vinegar over a fire. The white coating formed over the metal is then removed and reduced

to fine particles by levigation. Another source of white is *gofun*, a pigment made of crushed oyster shells. The shells are gathered in piles and left outdoors to break down for a protracted period of time – up to fifteen years can elapse to obtain the best quality. Afterwards the shells are reduced to fine calcium carbonate particles by the usual process of washing, grinding and levigation. From the sixteenth century onwards, *gofun* became the predominant white and an important constituent of pigment mixtures to obtain lighter colour tones. It can create a smooth layer ideal to delineate the minute details of a face (FIG. 63). However, this pigment tends to flake off over time, since it forms a thick layer that does not penetrate well into the paper substrate.

Sources of various colours, from mica to precious metals, are used to impart lustre to the book. Mica includes a number of silicate minerals, of which the white muscovite is predominantly used in Japan – when ground into a pigment, it creates subtle glittering effects. Gold, found in mines in mountain regions or in alluvial sediments such as the ones of Mutsu Province at the northern end of Honshu, can be easily hammered between sheets of paper until it is transformed into very thin leaves. Leaves of gold, or silver, can in turn be ground into pigment or be applied in whole squares, cut strips, scattered flecks or sprinkled powder, enlivening the surface of the book and gleaming in the light. Copper, silver or colourants are sometimes added to gold to create a variety of tones. Gold can also be polished to obtain various degrees of brightness, with beautiful results. The cover of the Bodleian’s copy of *The Tale of Akimichi* makes the most of the shimmering effects of different tones of gold,



used as paint, sprinkled powder and scattered flecks on *konshi*, the durable dark indigo blue paper described earlier in this chapter (FIG. 65). Silver, whether in leaf form or flecks, soon loses part of its original shine, often appearing tarnished as a dark grey colour. This deterioration effect derives from its sensitivity when exposed to atmospheric contaminants.

Any of the colorants above, whether from traditional sources or newly discovered, require a binder to turn them into usable paint. In Japan the customary binder is *nikawa*, a glue made from various animal tissues, mostly skin. The skins are generally sprinkled with lime and kept in piles for a period of time before being washed and cooked in hot water for several hours, at increasing temperatures. This protein solution is then cooled in trays, and cut up and dried into a glassy solid amber product. When needed as a binder, it is dissolved in hot water.



63 Detail from *Sumiyoshi Monogatari*, seventeenth-century painted handscroll. The face has been painted with *gofun*, a white pigment made of crushed oyster shell. Its typically smooth texture contrasts with the coarsely ground malachite pigment used for the green collar of the kimono. MS. Jap. c.8.

64 FROM TOP Cubes of dry *nikawa* glue from animal tissue traditionally mixed with pigments as a binder, white *gofun* pigment from oyster shell, gold pigment and white lead pigment from coils of lead metal.

A solution of glue and alum is generally used to coat the paper in order to create a surface suitable for painting. Another adhesive is rice paste, made by heating up rice flour and water. It is primarily used in woodblock printing as a colour thickener to help transfer the colour from the block to the paper without any colour bleeding. A different paste, made with wheat starch rather than rice, is commonly used for attaching backing paper and joining together separate parts of the book, whether in scroll or bound format.

UNDERSTANDING THE JAPANESE BOOK

Looking at the materials and the practical skills that lay behind the making of Japanese books has many benefits. It widens the ways in which this type of collection can be studied and interpreted, it helps to find suitable conservation treatments and long-term preservation strategies, and it shows the part played by the makers, a story often neglected. Acknowledging the craftsmanship present in Japanese books requires shifting the focus to the papermakers at work with the mould in their hands, to the ink makers, mixing soot with gelatine and aromatic spices, to the alchemist and later the chemist, creating colours with unassuming ingredients – and the list goes on.

65 Detail from *The Tale of Akimichi*, eighteenth-century manuscript. The shimmering gold effects are emphasized against the dark and glossy indigo of the *konshi* paper. The flowers and leaves are painted with a warm tone of gold; the sprinkled decorations are in a cooler tone. MS. Jap. d. 65.

