

Scarlet
 Cochineal
 Vermilion
 Rosso corsa
 Hematite
 Madder
 Dragon's blood

Red

In 2012 a study was published in the *Journal of Hospitality and Tourism Research*, advising waitresses to wear red. Why? Research found that if they wore this color, the tips they were given by male patrons would be increased by up to 26 percent. (It had no effect on female diners, who were stingier tippers overall anyway.)¹

Psychologists have long been fascinated by red's influence on the human psyche. A 2007 study, for example, tested the effect of color on intellectual performance. The test subjects were required to solve anagrams. Those whose tests had red covers performed worse than those with green or black; they also chose easier options when given the choice.² At the 2004 Olympic Games in Athens, combat-sport competitors who wore red won 55 percent of the time. And in a study of games played since the Second World War, English soccer teams who wear this color are more likely to be champions and on average finish higher in the leagues than teams in any other.³ Nor are we the only species to be susceptible. Monkeys such as rhesus macaques and mandrills have cherry-colored areas on their rumps, faces, and genitalia that indicate their testosterone levels and aggression.⁴ (However, the animal most famously irked by red, the bull, is color-blind. It is the flutter and swish of the matadors' small muleta cape that the bulls react to—tests have shown that they charge at the capote, which is magenta [page 167] on one side and blue on the other, with equal fury.)

It is believed that people first began dyeing cloth sometime between the sixth and fourth millennia B.C. Most of the scraps of dyed cloth that date from this time until the Roman era were colored a shade of red.⁵ (So special was this color that for the Romans the words *colored* [*coloratus*] and *red* [*ruber*] were synonyms.)

Ancient Egyptians wrapped mummies in linens dyed with hematite [page 150]; Osiris, god of the afterlife and underworld, was also known as the “lord of the red cloth.”⁶ It is, along with black, one of the colors the ancient Chinese associated with death, and the contrasting pair appear frequently in tombs and graves. Later it formed part of the influential five-element system, associated with fire, summer, and the planet Mars.⁷ Now, in addition to its link with the Party, the Chinese see it as the color of joy and good luck: gifts of money, called *hongbao*, are given in lacquer-red envelopes at special occasions like weddings.

As the color of blood, red is also strongly associated with power. The Inca deity Mama Huaco was said to have emerged from the Cave of Origin wearing a red dress.⁸ Pliny mentioned that the red dye cochineal was reserved for Roman generals, and the color, however conspicuous and impractical, has often been used by warriors since, including the British redcoats. The Aztecs painstakingly deposited cochineal [page 141] insect eggs onto cactus leaves with fox-hair brushes so that their rulers would have a ready supply of red-fringed headdresses and their priests could attract the attention of the gods during rituals.⁹ On the other side of the Atlantic, both kings and cardinals were inordinately fond of luxurious red clothes. In 1999 it appeared in 74 percent of the world’s flags, making it by far the most popular color to exemplify a nation’s identity.

As well as power, red has baser associations with lust and aggression. The devil is traditionally depicted in red. The association of red and sex in the West dates back at least until the Middle Ages. It was frequently the color assigned to prostitutes in the many sumptuary laws passed over the course of the period.¹⁰ Small wonder that it has had a stormy relationship with women. Hester Prynne,

the heroine of *The Scarlet Letter*, has so fascinated readers since the novel’s publication in 1850 because she defies easy categorization. On the one hand, she flouts the conventional sexual purity of her age and sex, but on the other, she accepts the condemnation of her Puritan neighbors and meekly wears a scarlet A as punishment. The ambivalent relationship between women and red can be seen in other works of fiction, including *The Bride Wore Red*, “Little Red Riding Hood,” and *Gone with the Wind*.

This potent brew of power and sexuality make the color a bold but tricky choice for brands. Virgin is perhaps the best example of a company that has successfully harnessed red’s innate power, but only by positioning itself as a bold outsider. Coca-Cola owes its livery to the red-and-white flag of Peru, which is where the company sourced the coca leaves and cocaine its drinks contained until the 1920s.¹¹ Artists of all stripes have relied heavily on the shades between oxblood and persimmon to add drama, eroticism, and depth to their work. For the Pre-Raphaelites reds—and redheads [page 105]—were almost talismanic. Rothko, who wrote that his art’s principle concern was “the human element,” layered tone upon tone of red on his giant canvases. He identified it, as the art critic Diane Waldman put it, “with fire and with blood.” Anish Kapoor, an avid user of color, spent the 1980s rendering his pyramidal, phallic, and vulva-like sculptures in a red so bright it almost vibrates. His *Svayambh* (2007) was a slow, crimson train of pigment and wax that squeezed itself back and forth through the triumphal doorways of the Royal Academy in 2009, looking, absurdly, like a voluptuously overweight lipstick. This mobile artwork, just like the red light on the traffic light, stopped people in their tracks.

Scarlet

On February 8, 1587, Mary Queen of Scots was executed after 18 years' imprisonment. Contemporary accounts of her death at Fotheringhay Castle are gruesome: several report that it took two blows to sever her neck; others say that when her head was held aloft her wig came off to reveal the near-bald scalp of a sick old woman. What many agree on, however, is that before the execution, Mary carefully removed her somber outer clothes to reveal a bright scarlet undergown. Sympathetic onlookers would have had no difficulty unraveling her intended message: scarlet was closely associated in the Catholic Church with martyrdom. For those hostile to the Scottish queen and her faith, however, her bright red dress was a clear link to the archetypal scarlet woman, the biblical Whore of Babylon.

This binary reading is typical of scarlet. Although it has long been prized as a color for the prestigious and powerful, it has, from the beginning, always been a victim of unintended meanings. The very name, for example, did not initially refer to a color at all, but to a kind of particularly admired woolen cloth. From the fourteenth century, because fine cloth was so often colored with kermes, the brightest and most resilient dyestuff then known, the word came to denote the color instead.

Like cochineal [page 141], kermes dye was made from the bodies of insects so small that they were often mistaken for seeds or grains.¹ (Pliny, writing in the first century A.D., described it as "a berry that becomes a worm.") Making a single gram of this precious red required the bodies of up to 80 female kermes beetles imported from southern Europe, making it very expensive, and getting precisely the right tone took skill. The finished product, though, was a dye so bright and colorfast that cloth dyed with it became the epitome of luxury.

An account book from the reign of King Henry VI, who ruled England during the fifteenth century, shows that it took a master mason a month to earn enough to buy a single yard of the cheapest scarlet cloth; the dearest cost twice as much.²

Charlemagne, the Frankish king who ruled during the early Middle Ages, is said to have worn scarlet leather shoes when he was crowned Holy Roman Emperor in A.D. 800. Richard II of England followed sartorial suit 500 years later. Sumptuary laws passed in León and Castile in the thirteenth century restricted use of the color to kings.³ Red-haired Elizabeth I, who knew a thing or two about the power of appearances, enjoyed wearing scarlet as a princess. It would not do, though, as a color for the virgin queen, and so after her coronation in 1558 she took to wearing neutral or broken tones like tawny, gold, and ash. However, this emblem of majesty was too useful to cast aside completely: Elizabeth hit upon the ruse of dressing her ladies-in-waiting and retainers in scarlet instead, presumably so that they could act as a dramatically symbolic backdrop. William Shakespeare, in his role as a royal actor, was given four and a half yards of cloth with which to fashion himself scarlet livery to wear at the coronation of Elizabeth's successor, James I.⁴ And where wealth goes, power soon follows. Pope Paul II decreed in 1464 that his cardinals were to wear robes of rich scarlet instead of purple, the poor Tyrian-purple mollusks [page 162] being all but extinct by this time.⁵ The habit stuck and scarlet became inextricably linked with insignia, particularly in the Church and academia, a heritage Mary was drawing on at her execution.

Although many associate the British with the idea of red military uniforms, scarlet's dalliance with men in uniform dates back much further. The highest orders

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of Roman generals wore bright red *paludamenta*—cloaks signaling leadership, which fastened over one shoulder.⁶ It was taken up by the English under Oliver Cromwell, who specified that officers' coats should be dyed scarlet in Gloucestershire using a newly discovered recipe.⁷

In 1606 Cornelis Drebbel, a Dutch scientist and the first man to build a working submarine, was making a thermometer in his lab in London. As the (likely apocryphal) story goes, he boiled up a solution of purple-red cochineal and left it under his windowsill to cool. Somehow a phial of *acqua regia*, a strong acid mixture, broke and spilled across the tin window frame, splashing into the cooling cochineal and instantly turning the liquid bright scarlet.⁸ One dyer's manual called the result "[f]lame-colored scarlet." "The finest and brightest color," the author wrote, "on the orange, full of fire, and of a brightness which dazzles the eye."⁹

Naturally, this brilliant red has had plenty of detractors too. It was a favorite of the Wife of Bath, Chaucer's morally ambivalent character in *The Canterbury Tales*. Shakespeare used it in conjunction with hypocrites, indignation, and "sinne."¹⁰ A purple passage from the book of Revelation in the King James Bible—"I saw a woman sit upon a scarlet colored beast"—led Puritans to argue that the entire Catholic Church, now known for its red-robed cardinals, was evil. It was this heritage that Aleister Crowley, the twentieth-century occultist, drew on when he created the Scarlet Woman, the Thelemic deity of female desire and sexuality. And while the hue has been almost continually in fashion since the fourteenth century, not everyone has approved. Scarlet "is a charming color," *Arthur's* magazine conceded in February 1885, "in spite of its being a favorite with Indians and barbarians generally."¹¹

Cochineal

Viewed with the naked eye, the female *Dactylopius coccus* could be mistaken for a seed or a piece of grit; scarcely bigger than a pinhead, it is a gray, slightly ridged oval. It was only when one was examined under a microscope at the very end of the seventeenth century that lingering doubts were put to rest: *Dactylopius coccus* is, in fact, an insect. And, while it may look inconsequential, this insect has made and felled kings and empires, and helped shape history.

Today the cocci are most likely to be encountered in Mexico or South America, huddled in a snowy white cluster on the sunny side of a prickly pear cactus leaf, on which they feed exclusively and voraciously.¹ If you were to pluck one off and squeeze hard enough to crush it, your guilty fingers would be stained bright crimson. Turning this bright red bug juice into a dye, often called carmine, is relatively easy. One needs only the insects and a mordant, usually alum, to help the color adhere to the cloth; by using other additives, such as acids or metals like tin, the color of the dye can be shifted from pale pink to a red so dark it is almost black.² It requires a lot of insects—around 70,000 dried bugs for a pound of raw cochineal—but the end result is one of the strongest and brightest the world has ever known. The colorant (mostly carminic acid), from a pound of "domesticated" or farmed cocci, is said to be equivalent to around 10 or 12 pounds of kermes [page 138].³

Civilizations have been aware of cochineal's colorful secret for quite some time. It was used as a dye in Central and South America from at least the second century B.C. and became intrinsic to the Aztec and Inca Empires. A list written around 1520 recorded the tributes the Aztecs required from their subjects: the Mixtec people were to give 40 sacks of cochineal per year; the Zapotecs,

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20 bags every 80 days.⁴ It was also used to signal personal power in the region. Captain Baltasar de Ocampo, who in 1572 witnessed the execution of Túpac Amaru, the last of the royal Inca line, carefully described the king's outfit in a moving eyewitness account of his death.

[Dressed in a] mantle and doublet of crimson velvet. His shoes were made of the wool of the country, of several colors. The crown or headdress, called mascapaychu, was on his head, with fringe over his forehead, this being the royal insignia of the Inca.⁵

When his head fell, the Inca ruler was clothed in a symphony of cochineal.

It was in part for the sake of cochineal that this Inca king—and many other South American rulers—died. The Spanish were desperate to exploit the region's natural resources, and they were not slow to capitalize on them once they gained control. Along with gold [page 86] and silver [page 49], cochineal provided the financial sinew on which the Spanish Empire depended. One observer wrote that in the year 1587 alone, around 144,000 pounds or 72 tons of cochineal were shipped from Lima to Spain.⁶ (That is roughly 10,080,000,000 insects.)

Once the shipments arrived in Spain—they were legally required to land in Seville or Cádiz until the eighteenth century—cochineal was exported to paint the towns and people of the world red. It dyed the famous Venetian velvets from the mid-sixteenth century, funded the Dutch dye industry, clothed Roman Catholic cardinals, gave women's cheeks a rosy flush, and was also used as medicine. King Philip II of Spain was dosed with a revolting mixture of crushed bugs and vinegar when he felt under the weather.⁷ Later it was traded to Cambodia and Siam, and by 1700 the Chinese Kangxi emperor

referred to a foreign dyestuff called *ko-tcha-ni-la*, later renamed *yang hong*, or “foreign red.”⁸ Americans, desperate for the bright dyestuff but furious that, because it could only be traded to them via Spain, it cost so much, would pore over the contents of shipwrecks in case they contained cochineal. The *Nuevo Constanie*, which sank off the coast of Louisiana in 1766, was found to contain over 10,000 pounds of the dye in leather sacks.⁹ It was deemed so valuable that there were several attempts to bug-nap cochineal in order to break the Spanish monopoly. A foolhardy attempt in 1777 by Nicolas-Joseph Thiéry de Menonville, a botanist from Lorraine, was covertly financed by the French government.¹⁰

Beetles are still being harvested today to produce the cochineal used by the cosmetics and food industries. It is found in everything from M&M's to sausages, red velvet cupcakes to Cherry Coke (to soothe the squeamish it is usually hidden under the far more innocuous label E120). There are signs, however, that humanity's appetite for cochineal may finally be waning: in 2012 Starbucks abandoned it as the principal red food coloring in strawberry Frappuccinos and cake pops after an outcry from vegetarians and Muslims. Excellent news for *Dactylopius coccus*, but perhaps less so for the world's prickly pears.

Vermilion

By the beginning of the twentieth century, Pompeii had been the site of an archaeological dig for over 150 years. What had begun as a scramble to strip away ancient trophies for the private collection of the Bourbon king Charles III had evolved into an effort to preserve the wonders of the city that had been simultaneously destroyed and preserved by the eruption of Vesuvius in A.D. 79. In April 1909, when it seemed as if Pompeii might have disgorged most of its secrets, archaeologists discovered a luxurious home with large windows, overlooking the sea. Within a week of the first excavation, a red mural was uncovered that was so well conserved, elaborate, and unfathomable that ever since the site has been known as the Villa dei Misteri—"Villa of Mysteries."

The walls of the room are covered with expressive images of people on an intense ground of deep red vermilion. In one corner a winged figure raises a whip to strike the back of a naked woman kneeling with her face buried in the lap of another. Near the entrance a small boy is lost in the contents of a scroll he is reading; at the center a drunken man lolls against the skirts of a seated figure. Guesses as to what it all means are boundless, but the extravagant use of vermilion tells us that whatever its purpose, this room was intended to induce awe: vermilion was the most coveted red pigment available at the time.

A natural supply of vermilion (mercury sulfide) comes from the mineral cinnabar. This wine-red stone is the principal ore of the metal mercury—the Roman architect Vitruvius picturesquely described the dark red rocks sweating droplets of quicksilver. To become a useful pigment it need only be finely ground. The Romans adored it. A jar of ready-ground cinnabar of the kind used in the villa was unearthed in a pigment shop in the town

below the Villa dei Misteri. Pliny wrote that it was used during the religious holidays, smeared on the face of statues of Jupiter, and on the bodies of worshippers.¹ Vermilion, though, was scarce. Much of the Roman supply came, under guard, from Sisapu in Spain, and cost 70 sesterces a pound, ten times the price of red ocher.²

It was when people discovered how to manufacture vermilion artificially, however, using a reaction that resembled magic, that desire for the pigment really intensified. No one is quite sure who made the discovery, or when: alchemists were fond of using elaborate codes for ingredients and hinting that they possessed special knowledge, without revealing precisely what this knowledge might be. The Greek alchemist Zosimus of Panopolis insinuated that he knew the secret sometime around A.D. 300, but the first clear description is in *Compositiones ad tingenda* ("Recipes for Coloring"), a Latin manuscript from the eighth century.³

The reason for all this subterfuge lies in alchemists' obsession with creating gold [page 86], which to them was red, rather than yellow, and which they therefore linked with this new red pigment. Even more significant was the fact that making vermilion required the combination and transformation of two key alchemical ingredients: mercury and sulfur. The alchemists forging vermilion were convinced the secret to producing unlimited supplies of gold could not be far away.

The most evocative description of what became known as dry-method vermilion was written by the twelfth-century Benedictine monk Theophilus. He described mixing one part ground sulfur with two parts mercury, which was then carefully sealed in a jar:

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Then bury [the jar] in blazing coals and as soon as it begins to get hot, you will hear a crashing inside, as the mercury unites with the blazing sulfur.

If conducted carelessly, the reaction could be even more dramatic than intended. The mercury fumes released if the jars weren't sealed properly were so poisonous that the process was banned in Venice in 1294.⁴

Vermilion was once as costly and precious as gold.⁵ It reigned supreme as medieval artists' red and was used, reverently, alongside gold leaf and ultramarine for manuscript capitals and on tempera panels. It was glazed with a revolting mixture of egg yolk and earwax.⁶

But this prince of reds was too profitable for recipes and manufacturers to remain scarce. In 1760 Amsterdam, the principal source of Dutch dry-method vermilion during the seventeenth and eighteenth centuries, exported just under 32,000 pounds to England.⁷ A wet method of manufacture, discovered by the German chemist Gottfried Schulz in 1687, made it more common still. Even as early as the fifteenth century artists had been all but profligate with its use; Leonardo da Vinci occasionally used it as a grounding layer for his paintings.⁸ Not only was vermilion becoming more common, it was also adversely affected by the rise of oils as the painting medium of choice in the West from the fifteenth century onward: vermilion was less opaque in oils, and so worked better either as a base layer on which to apply other red glazes, or as a glazing layer itself.

In tempera and lacquerwork, though, its color is breathtaking, and it has seduced artists the world over. A Chinese handscroll painting, *Tribute Horse and Groom* by Chao Yung, shows a man wearing a fire-red coat with an indigo collar, and a strange, rust-colored pointy hat,

leading a beautiful dappled gray horse. Although it was painted in 1347, the vermilion-painted coat still strikes the eye like a hammer. The same effect was used three centuries later by Peter Paul Rubens in the central panel of his triptych *The Descent from the Cross* (1612–4), although its use declined thereafter.⁹ In 1912, just a few years after the Villa of Mysteries was uncovered, Wassily Kandinsky described vermilion's color as "a feeling of sharpness, like glowing steel which can be cooled by water".¹⁰