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COLOR

A Natural History of the Palette

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Violet

"I will tell you.

*The barge she sat in, like a burnish'd throne,
Burn'd on the water: the poop was beaten gold;*

Purple the sails, and so perfum'd that

The winds were love-sick with them."

WILLIAM SHAKESPEARE: *Antony and Cleopatra*, II ii

The story of how modern purple dye was discovered has become a legend in the history of chemistry: a spring evening in London, a teenager packing up after a day spent trying to find a cheap cure for a killer disease, an accidental drip on a laboratory basin, and suddenly the world changed color. What is less well known is how it also set off a chain of events that led to the rediscovery of two long-forgotten ancient dyes: the color of Cleopatra's sexy sails and that of the Temple of Solomon.

In 1856 William Henry Perkin was eighteen and something of a prodigy at the Royal College of Chemistry. He and his classmates had been looking for a synthetic alternative to quinine, the malaria remedy that until then was only found in the bark of a South American tree. His teacher had noticed that some of the substances left over from gas lighting were very similar to quinine, and he had persuaded his students to try to work out how to add hydrogen and oxygen to coal tar and make their fortunes.

Perkin loved chemistry, and he had set up the top floor of his

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parents' house in the East End of London as a laboratory. It was there that, washing his glass flasks one evening, he noticed a black residue. As he explained to a news reporter many years later during a visit to America, he was about to throw it away when he paused, thinking it might be interesting. "The solution of it resulted in a strangely beautiful color," he told the journalist. "You know the rest."¹

I used to live just 50 meters away from where Perkin grew up, near Shadwell Basin in Docklands, and I remember one day noticing a blue historical plaque on the side of a housing estate. It told me that this was where the first "aniline dyestuff" was invented in March 1856, in a home laboratory. I went home and looked up aniline in the dictionary—it is, as I would remember much later during my quest for indigo, derived from "nil," the Sanskrit word for that dye—and I imagined a color as blue as the plaque. It was years later that I learned that Perkin had accidentally made mauve.

He didn't call it "mauve" at first, though. He initially called his discovery "Tyrian Purple." For Perkin this would have been almost a legendary description remembered from his days learning Latin. He would have known it was an ancient dye once worn only by emperors, and he would have chosen the name to suggest a sense of luxury and elitism—no doubt to encourage buyers to part with more money than they wanted to spend. It was only later, realizing perhaps that scholarly historical references were not necessarily the way to attract buyers of high fashion, that he renamed it after a pretty French flower.²

Whatever the final name, Perkin was lucky: he had discovered the color of the moment. That year Queen Victoria had commissioned the French craftsman Edouard Kreisser to make a cabinet for her consort Albert's birthday. Inspired by a revival of interest in the bright enamels of Sèvres porcelain, it is a cheerful combination of turquoise and pink flowers curling around two blonde ladies in lovely purple dresses.³ By 1858 every lady in London, Paris and New York who could afford it was wearing "mauve," and Perkin,

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who had opened a dye factory with his father and brother, was set to be a rich man before he reached his twenty-first birthday. Without his discovery industrial dyers would probably have fulfilled demand by blending indigo with madder, or using lichens. But nothing had quite the totally purple appeal of Perkin's synthesized dye.

Coal tar, an organic substance that comes from very ancient fossilized trees, proved to hold the potential for thousands of colors, and Perkin's invention went on to inspire chemists to find many other petrochemical paints and dyes. Within a decade they would almost totally replace many of the colors that have been the subject of this book. Moreover, as Simon Garfield showed in his book *Mauve*, Perkin's discovery would have many beneficial medical and commercial spin-offs and would lead other scientists to the discovery of cholera and tuberculosis bacilli, to chemotherapy, immunology, and the mixed blessing of saccharine. Some of the biggest pharmaceutical companies in Europe today—including BASF, Ciba and Bayer—began as small dye works in those crazy days of trying to extract more and more colors from coal.

But the frenzy of the "mauve decade" would also revive interest in that earlier purple, from the mysterious Tyre. Within four years the French Emperor Napoleon III would send an archaeological expedition to try to find out where this place was, and whether anything remained of its riches. And some years later a number of Jewish scholars saw what Perkin had done and began what turned out to be the very slow process of unravelling the mystery of the most sacred thread in Judaism.

Tyrian purple, educated Victorians knew, was made from shellfish found in the eastern Mediterranean. But which ones, and how they were processed, was not known in those mauve days of the 1850s. The old-time dyers had disappeared with the storming of Constantinople in 1453 (or even before: possibly the last recorded mention of purple dyeing as an ongoing industry was in Benjamin of Tudela's journal in 1165 when he mentioned that the Jewish community of Thebes was famous for its production of silk gar-

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ments and purple) and they had not left any records of their secrets. Nor was anyone quite sure what their finished product looked like either. Was the purple dye of Imperial Rome similar to the shade that Perkin had discovered—an almost gaudy version of the final shivers in the spectrum? Or was it a different, more mystical color appropriate for a man who had the blessings of the gods behind him to wear in public? And what—or where—was Tyre anyway?

When I decided to find purple for myself this last question was easily answered. A quick consultation of the *Times Atlas* confirmed that Tyre—or Sour, Sur or Tyr, as it is variously spelled—was the most southern port in Lebanon. It was north of the disputed Israeli border and south of the capital of Beirut. But to answer those other questions—about the nature of the dye works, about why their famous product was so highly prized, and whether it was reddish or bluish or something quite different—I decided to begin by going to the source of the dye, or at least to the source of the name of the dye.

A FUNERAL

When I arrived in Beirut my ultimate quest was of course to find purple. But my primary aim that first morning was to find coffee. On most days this would be even easier than locating a bullet-marked wall in the city's war-torn center, but my timing could not have been worse. It was the funeral of Syrian President Hafez al-Assad, who had died a few days before, and Lebanon was closed out of respect for its more powerful northern and eastern neighbor. Even those places from which the aromas of *arabica* wafted like seductive genies to beguile me were "closed," with proprietors shooing me away with worried looks. One café owner said the fines for not grieving publicly were higher than small businesses could afford: if they had admitted a paying customer that day they could have been bankrupted.

One of the cafés where I couldn't buy coffee had a TV playing.

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Grim-faced men in suits were escorting a coffin along a street in Damascus lined with people wearing black. It is curious that now black and only black is the color of mourning in many countries (except in parts of Asia, where people wear white), but as recently as the 1950s purple was just as appropriate at British funerals. When King George VI died in 1952, black and mauve knickers were solemnly placed in haberdashers' windows in the West End, a columnist in a British paper remembered recently,⁴ while British court circulars included mauve in their rule of dress for half-mourning until around that time.⁵

Black and white seem to represent absolutes—either the total absorption of light as you leave the world, or the total reflection of the light as you return to a state of luminosity, depending on your belief in incarnation. And violet is the last color in the rainbow spectrum, symbolizing both the ending of the known and the beginning of the unknown—which is perhaps why it was also suitable. The seventh-century saint Isidore of Seville, who incidentally is now the patron saint of the Internet because of his genius for compiling facts, suggested in his *Etymologiae* that the word “purpura” came from the Latin *puritae lucis*, meaning “purity of light.” It is probably not true, but it played a useful public relations role for purple right up until the Renaissance, and was perhaps instrumental in keeping it a color associated with the spirit.⁶ Certainly, by the time Victorians were wearing Perkin's mauve in funeral processions, purple had been the color of grief in Britain for several centuries already: on September 16, 1660 Samuel Pepys wrote that he had gone “to White Hall garden, where I saw the King in purple mourning for his brother [the Duke of Gloucester, who had died three days earlier of the smallpox].”

Where was everyone? I wondered as I strolled through Beirut streets that had barely a car or even a pedestrian in them. When I reached the Corniche—the palm-fringed esplanade where once Beirut's playboys drove their sports cars to show off—I found half my answer: the jagged rocks beneath the road were covered with

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beach towels and holiday-makers chatting and bathing. A normal holiday in the sunshine, but there was just one odd thing about it. They were all men.

It was lunchtime before I found any breakfast, so I enjoyed mid-day coffee and yogurt in the restaurant at the top of the five-star Sofitel, which was the only place I found open. My table overlooked what once must have been a chic seaside club, and my little mystery was solved. The private swimming pools far below were empty of water but packed full of sunbathing women crowded together and enjoying the rays from behind high walls. My quest for imperial purple was connected with loss and luxury, with hidden things, and of course with the sea: I wondered whether my whole experience of Lebanon would demonstrate those elements quite so neatly as my first day had done.

The concierge told me that if I thought Beirut was dismal that day then the pro-Syrian Muslim towns, including Tyre and Sidon, would be even worse. Head north, to the Christian area, he advised when I told him about my search. “They won't be in mourning so much, and you'll find many Phoenician remains there. And plenty of coffee, of course.”

The Phoenicians were the people I was looking for—early inhabitants of Lebanon who had arrived from the Arabian peninsula in the third millennium B.C., and established themselves all along this rocky coast. They were sea adventurers, traders, artists and carpenters, and they became known for their sophisticated steering by the stars and for their early creativity with colored glass. They were also said to have invented the archetype for the alphabet that made the words on this page possible. But, most importantly for my own search, these people also became so famous for trading the most luxurious dye in history that their very name derives from the Greek word for purple, *phoinis*. I would first find what remains of the Purple People, I decided, and then later I would look for the color they were named after. So I took the concierge's advice and hired a car.

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I had been surprised earlier, when I studied the map of Lebanon, to see how tiny the country was. Its violent civil war from 1975 to 1990 has given it an international notoriety—to my generation at least, watching the hostage crisis unfold through the 1980s—quite out of proportion to its area. The whole of Lebanon is in fact a little smaller than the Falkland Islands and half the size of Wales. In just over an hour I had negotiated Beirut—and was in the town where books were born.

THE PURPLE PEOPLE

The town of Jbail (its Arabic name) or Byblos (its Greek one) shows few signs of the country's most recent war except that the hills above it are clad in ugly concrete villas. They are owned, I was told by a disapproving Byblos resident, by Beirutis fleeing the fighting on weekends. But if—or perhaps because—it doesn't show much indication of contemporary warfare, it is one of the finest places in the country to see signs of all the other factions who have battled for this coastline for the past seven thousand years or so—including my Phoenicians.

It was almost sunset as I headed past the immaculately renovated souk, and went straight to the headland. This small area is covered with the rocks and ruins of many former residents of Byblos—starting with Neolithic settlers and continuing with the Phoenicians, Greeks, Romans, Byzantines, Umayyads, Crusaders, Franks, Mamelukes, Ottomans, Arabs, and tourists. I was a member of the last category, and so I was assigned a guide—in the form of Hyame, an archaeologist, and we wandered contentedly between the old walls until nightfall, her stories bringing this deserted place of rubble and grasses to life.

The Phoenicians were little people, Hyame told me. If a man measured 1.5 meters and was handsome with it, he would have been a most desirable catch in Byblos four millennia ago—and women were even smaller. Their houses had neither doors nor

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windows, and were accessed by ladders, leading to trapdoors in the roof. They would light the dark interiors with oil lamps, which incidentally they had invented. What happened when they got too old to climb the ladders? I asked. "They didn't live very long so it didn't matter," my guide answered cheerfully.

It was a curious notion, as we stood in this quiet place, that four thousand years ago the space in front of us would have been noisy and packed with people: tiny traders doing business with tiny consumers. The shops—you can still see the "dental" pattern where each stall was grooved into the city wall—were barely deep enough to swing a candle. Those spaces now filled with weeds would once have been stuffed with cheese and capers, ropes and remedies, and special things for boats and journeys. Some of the merchants would even have had thick slabs of ice dripping dark pools in the sunshine: with Mount Lebanon so close, agents could get ice rushed down the mountain throughout the year. It would have been useful for keeping food fresh on board, or perhaps even for providing cool lemon drinks for the sweltering passengers and crew as they journeyed away from this city, carrying bundles of the papyrus scrolls that gave both Byblos and the Bible their names.

And in the old Phoenician market there would, Hyame agreed, probably have been a whole street of colors—coal-like lumps of indigo, bags of scented saffron, cakes of white lead from Rhodes, chunks of lapis coming through from Afghanistan and, of course, that valuable purple dye. For millennia this was one of the most prized products of the coastline—and it was seen as symbolic of both the heavenly world and the best of the human world. It was used in the holiest of Jewish temples (the Tabernacle—the sacred tent containing the Ark of the Covenant which the Jews carried with them in the wilderness—was to be made "with ten curtains, of fine twined linen, and blue and purple and scarlet": Exodus 26, 1) and at the same time it played an important role in secular offerings. In the sixth century B.C. King Cambyses of Persia sent a team of spies to Ethiopia, hoping they would come back with

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detailed plans of how best to attack the country. They carried with them many presents—incense, necklaces and palm wine, and a precious purple cloak. According to the Roman historian Herodotus,⁷ the King of Ethiopia was distrustful not only of Cambyses's intentions but also of his gifts and particularly of how the cloak came by its very special color. "Taking the purple cloak, he asked what it was and how it was made, and when the [diplomatspies] told him the truth about the purple and the way of dyeing, he said that both the men and their garments were full of guile."

The Persians and Jews liked purple greatly, but it was in the Roman and then later the Byzantine appropriation of this dye that it gained its real reputation—when emperor after emperor had their new clothes made from it. So I turned inland to find the Romans—and the greatest temple they ever built.

THE FLUTTERING OF A BUTTERFLY'S WINGS

Near the famous cedars, high up on the slopes of Mount Lebanon, I picked up two Belgian hitchhikers. "We'll get our luggage," they said, and went inside their hotel to emerge with dozens of cases, and what looked like a huge hatbox. We filled the car. Alain was a butterfly collector looking for the rare Mount Lebanon Blue butterfly, and his wife Christina—now hidden under the bags—was there because he had promised her that they would stay in hotels rather than tents. Butterfly collectors were peculiar people, Alain said: "We like to camp in nature, wash in mountain streams and wake up early, just to see one specimen that is not dissimilar to another specimen." Christina concurred with an element of resignation. "I don't like to go: it's boring and they drink too much," she said.

As we drove along the curving mountain roads, Alain talked about his blues, and I talked about my purples. Butterflies, he then told me, are very good at seeing purple. In fact they have a very different range of color vision than humans. Reds are usually invisible for them, but they can see all the way up the rainbow scale

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from yellow to beyond violet and into ultraviolet. How could anybody know that? I wondered aloud, and he told me that some flowers—and butterflies—appear to human eyes to be completely white. But when you look at the petals or wings under an ultraviolet detector, they are covered in ghostly markings that butterflies respond to as signals.

At that moment in Alain's story we drove past a large clump of white flowers on the roadside, and I wondered whether they had any markings that I couldn't see. For the first time I thought how arbitrary our "visible light" spectrum is. Patterns drawn in ultraviolet might make those ordinary little petals into the exotic peacocks of the botanical world, and yet we cannot appreciate them. If we could see a wider range of light frequencies than those flowers could be as entrancing as tiger orchids. But if we could see a narrower range, then who knows: perhaps I wouldn't even be able to see my original Tyrian purple. If I ever found it, that is.

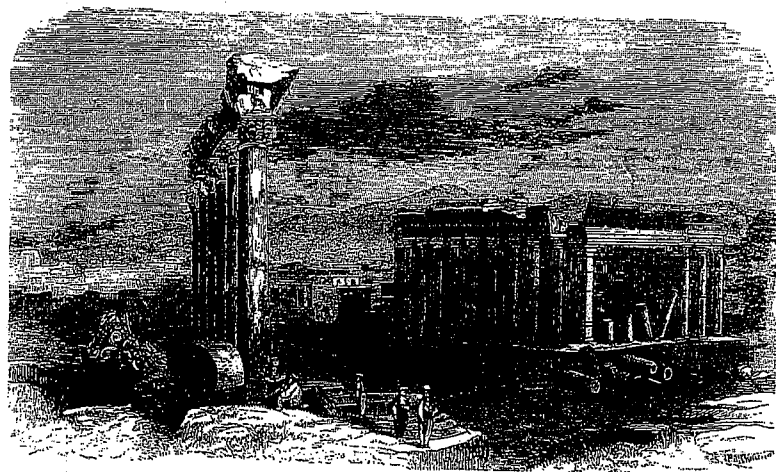
PASSION AND POWER

We could see the giant columns of Baalbek from far away across the Bekaa plain: they dominated the small dusty town that shares their name. Today Baalbek is a series of picturesque ruins, but once this was the site of the largest temple in the Roman Empire—dedicated to Jupiter, ruler of the gods. As we passed I noticed it was full of building workers, so I dropped off the butterfly collector and his wife—together with their many nets and boxes—and went to investigate.

Once a year thousands of people go to Baalbek for a contemporary ritual—a music festival that invites international stars like Sting, the Paris Opera Ballet and the members of the Buena Vista Social Club to perform in the ruins. I was there a few days before it started, and the organizers were sorting out a stage and seating. All the noisy construction work only emphasized the general destruction of the ancient building—the Temple of Jupiter was truly

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a giant ruin. At one time it was twice as big as the Acropolis in Athens. Now there were just a few walls and a lot of Roman rubble—including great granite pillars from as far away as Aswan in Egypt and Tripoli in Libya—as a reminder of the past.



Nineteenth-century engraving of Baalbek

But close by the newly dedicated Temple of Song was another smaller temple that has always been dedicated to wine. This was the shrine of the party god Bacchus (the Roman equivalent of the Greek god Dionysus), and it had stayed relatively intact—I could still see the carvings of eggs and cattle horns, grape leaves and honey entwining pillars, all symbolizing fertility and fun. It was “the nightclub” of its time, said our guide, Ghazi Ygani, pointing out the wine cellar that was for the exclusive use of the priest, the bartender of his time perhaps. This temple was preserved, ironically, because it was less important than Jupiter’s showy complex—the foundations were lower down to represent the god’s lower position in the hierarchy. So when the priests moved out and decay moved in, its walls were more quickly covered by layers of

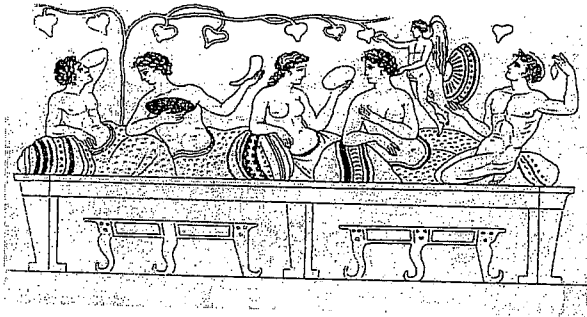
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protective soil. It is astonishing now—after extensive archaeological excavations cleared the site in the 1920s—to see how far the earth has settled. High up on the wall, 12 meters above our heads, I could just see the scrawled names of German visitors. “Those graffiti were written in 1882,” said the guide, as the four people in my tour group crowded into a tiny handkerchief of shade. “That was the level of the ground.”

It was interesting that the rivalry between Bacchus and Jupiter—between sexuality and power—should have been fought out so visibly in the very stones of this place. Because the symbolism of purple is equally ambiguous. In terms of formal power, purple often was, and often still is, the color of royalty or of the highest vestments of priesthood. And yet in terms of unbridled revelry, if Bacchus ever had a color he could claim for his own it should surely be the shade of tannin on drunken lips, of John Keats’s “purple-stained mouth,” or perhaps even of Homer’s dangerously wine-dark sea.

A defining moment for purple as the center of both sexuality and power was played out at a famous dinner party in 49 B.C. Julius Caesar had just won a key battle against Pompey, and Cleopatra organized a feast for the aging hero in a palace described as “luxury, made mad by empty ostentation.” It wasn’t just the Egyptian queen’s sails which were purple—her whole palace was lined with purple porphyry stone, as those of the Byzantine emperors would be lined centuries later, leading to the phrase “born in the purple.” The sofas in Cleopatra’s staterooms were covered with gleaming covers: most of them, “long steeped in Tyrian dye, took on their stain from more than a single cauldron.”⁸ A hundred years later, this would be seen as common: “Who does not use this purple for covering dining couches nowadays?” a jaded commentator on interior design called Cornelius Nepos would ask.⁹ But for Julius Caesar all this oriental excess was fairly new. Impressed, he fell into his hostess’s arms—to the disgust of his generals, who suggested Cleopatra was “whoring to gain Rome.” Caesar was unrepentant,

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A seductive sofa scene

and when, a short time later, he returned to Rome, he introduced a new fashion item in honor of his two most recent conquests: the totally purple, sea-snail-dyed, full-length toga. An item only Caesar was allowed to wear.¹⁰

It is strange today to picture how ambitious civil servants and soldier officers in Ancient Rome must have sighed for the forbidden pleasure of wearing robes or hoisting sails that were one particular shade of reddish blue. But at some points in the history of these stone-paved streets of Baalbek that I was walking along—and indeed in every town in the Roman and Byzantine empires—had I been an ordinary person wearing clothes dyed with Tyrian purple I would have been killed. And at other points in the town's history I would have been admired: I was wearing purple—I *must* be someone important. Or at least (since they were so expensive that even the third-century Emperor Aurelian once famously told his wife they couldn't afford for her to buy a purple dress) someone very rich.

The various rules about this color over the centuries are bizarre and fairly confusing. In some reigns (Nero's was one of them, but the fifth-century Christian emperors Valentinian, Theodosius and Arcadius were even more vehement) almost nobody could wear mollusk-dyed purple, on pain of execution. Sometimes (as in the

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time of Septimus Severus and Aurelian in the third century) women could wear it, but only very special men like generals could join them. In other reigns—and Diocletian in the fourth century was particularly enthusiastic—everybody had to wear as much purple as possible, with the money going straight into the imperial coffers. When any new ruler appeared on the scene, powerful people must have looked to their wardrobes and wondered what they would be allowed to wear during the following season.

The Byzantine emperors continued the Roman tradition of exclusivity,¹¹ although the purple dye works were gradually moved north toward Rhodes and Thebes. One of the most extraordinary series of mosaics that survived the seventh and eighth centuries, when the Byzantine Christians destroyed much of their art, is in the San Vitale church in Ravenna in Italy. It shows the Emperor Justinian's wife Theodora, surrounded by attendants, covered in jewels, and wearing a deep, almost crimson, shade of purple. The Ecumenical Patriarch in Constantinople apparently used to write his formal signatures in this color¹² (he now uses ordinary black ink) while some of the most sumptuous books of the sixth and seventh centuries were written on calf vellum that had been dyed purple. The National Library in Vienna owns one of these books, and one of the most remarkable pages in it shows the story of Joseph, nearly naked and being seduced by a very insistent Potipher's wife. The writing above the painting was once silver but has now tarnished to black, while the background to this sexy scene is a soft crimson, as if it had been stained with blackberries.¹³

Purple is not the only color in history to have been bound by strict rules—in England there was a particularly rigorous ruling introduced by King Richard I in 1197 called the Assize of Cloth, effectively confining lower classes to common gray clothing; in China, during the Qing dynasty (1644–1911), there was a shade of yellow that could be worn only by emperors; by contrast (an optical as well as a political contrast) after the 1949 Maoist revolution all Chinese, whatever their rank, had to wear clothes dyed blue—

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I remember a Tibetan nun telling me that when she was a child growing up in Tibet nobody but monks and nuns was allowed to wear orange or red. But purple is certainly the color that has been most legislated about, over the longest time. We don't have any true equivalent today—Perkin's moment of curiosity in the lab ensured that today we can dye our clothes virtually any garish or subtle color we want, and only the fashion gurus dictate what colors we are permitted to go out in. Perhaps the only place this kind of color coding works today is in a rigid structure like an army or a school, where small variations in uniform still signal hierarchy.

Many classical commentators wrote about this phenomenon—Pliny is one of the best sources. But he was not very impressed.¹⁴ “This is the purple for which the Roman fasces and axes clear a way,” he wrote. “It illuminates every garment, and shares with gold the glory of the triumph. For these reasons we must pardon the mad desire for purple, but why the high prices for . . . a dye with an offensive smell and a hue which is dull and greenish, like an angry sea?”

Like Pliny, I found it hard to really appreciate the appeal of this purple, I realized; nor did I understand how it could be extracted from mollusks. The national mourning was over, and it was now time to go to the town of Tyre, to try to find out how it was made, and what it looked like.

TYRE

There were only two hotels in Tyre, my guidebook told me. One, it claimed, was nasty, the other expensive. But as I drove around the town, lost in the dark, I spotted a third. It was called Hotel Murex—after the Latin name for the species of shellfish, *Murex brandaris* and *Murex trunculus*, that I was looking for.¹⁵ I have never quite figured out why I find murex such an ugly word. Perhaps it sounds too much like the kind of name a toilet-cleaner manufacturer would invent, along the lines of “Murex: We make sure your bacteria

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don't breed.” But I didn't want to let my etymological prejudices get in the way of my quest, so I parked the car and checked in.

It was music night at the Murex. An Arab band was making the restaurant jump, and men danced with men, women with women, in a raucously joyful wall-thumping party that lasted through to the early morning. The hotel had opened just a few weeks before, and was owned by a rich émigré Lebanese family. I talked to their son, who was in his mid-twenties. He said he lived in Africa, traded diamonds and dreamed of marriage with his fourteen-year-old girlfriend. “When she is ready, of course.” His parents had chosen the hotel name because they felt it was a celebration of the past wealth of Tyre, and of a time when the whole Mediterranean world had heard of their city.

In the lobby there was a display case of marine artifacts, and the centerpiece was a large murex shell. It was about the shape and size of a triple-scoop ice cream—although with a thinner cone which curled—and it was vanilla colored. According to Pliny, murex catch their prey by piercing them with their spines—and the many spikes were certainly fairly sharp, although I did wonder whether they were quite sharp enough. I once saw a large collection of shells from the murex family—some of them (*Murex palmarosae*, for example) were as evil looking as a lionfish, others were like strange delicate skeletons. Most of them have some kind of potential for purple (which comes from a gland near the anal opening: Pliny was quite far wrong when he suggested nicely that it was a mouth), but the best are *Murex brandaris*, which live in mud, and *Murex trunculus*, which can be found on the rocky bottom of the sea floor.

This one was *trunculus*, and it had been found by one of several muscular men in singlets who seemed to hang around the reception desk. I asked him where he found it, and he said he could show me. He had found it as a shell a few kilometers away, but we hatched a plan to go out in his brother's fishing boat and search for live murex, which, he said, were rare but possible to find. I had an image of

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dropping cockles tied to pieces of string into the sea to "attract the purples, which go for them with outstretched tongues," just as Pliny described. But the next morning, when we were booked to go out on the boat, the waves were too rough for an expedition.

In 1860, four years after Perkin's purple had been invented, Napoleon III sent a team of archaeologists to Tyre, to try to locate the island fortress and see what remained of the Phoenicians. "One can call Tyre a city of ruins, built out of ruins,"¹⁶ pronounced Ernest Renan, who was in charge of the excavations, when he saw what was left. Today there are now even more ruins—the most recent war has left its own bullet-marked devastation. Where the old ruins happen to be near the new ones it gives a strange impression that history has concertinaed: two thousand years of war and peace blended together in the universality of crumbled walls.

I found it hard to imagine, as I strolled through modern streets on reclaimed land toward the busy and smelly Phoenician port, what Tyre must have been like when the French team arrived. It was desolate—even twenty years later a visiting English traveller wrote that "The streets are most wretched . . . while windowless mud-floored hovels nestle among huge fragments of polished granite and porphyry columns prostrate in rubbish," and was able to conclude that the prophecy by Ezekiel in around the sixth century B.C. ("I will make you a bare rock; you shall be a place for the spreading of nets; you shall never be rebuilt"—Ezekiel 26, 4) had apparently come true. Although God must have been merciful, since when I visited the place had certainly been rebuilt—with plenty of concrete.

When Renan arrived he pronounced the job almost impossible. The town's curse had meant it had been attacked and besieged many times; archaeological scavengers had taken what they could of the Greco-Roman marble and disturbed the major sites, and after digging five trenches and uncovering almost nothing it seemed to the team that there was little left. Then suddenly their luck seemed to change, and they discovered stone sarcophaguses

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from 500 B.C. and a Byzantine church with its mosaic floor miraculously preserved. But to Renan's disappointment he did not find remains from the era he was really looking for, and Roman Tyre would be allowed to sleep a little longer—until the early twentieth century, when an entire Roman town was discovered to the south-east. It included a triumphal archway (which no doubt was first opened with a ceremony in which the important officials wore plenty of purple) as well as a necropolis full of carved tombs, a hippodrome worthy of any epic chariot race, and, most important for my own quest, murex dye vats. The latter might be rather humble looking, but they are what made this town famous. Indeed, they are probably what paid for everything else.

I tried to get there on my second full day in Tyre, when once again the storm waves made it too dangerous to go fishing for shellfish. But I don't think many tourists go to the archaeological site to find the antique purple dye baths, and access is limited. The guards at the ruined city kept shooing me away from this overgrown corner of the site—why didn't I want to stroll under the monumental archway or examine the grand gravestones like everyone else?—and I had to resort to devious methods to get a good view. These mostly involved pretending to look dreamily at the sea and then dashing across fallen marble columns when the two men were looking the other way.

The most telling thing about the dye vats is their location. They are very much on the edge of the old town, on the side where the wind would blow the smell away. With Tyrian purple—as I had learned in my quests for indigo and madder and many other organic dyes—the beauty of the color is in the effect rather than the process. Purple was a very smelly business: there is an extraordinarily wide difference between the sublime nature of this luxury product and the urine-and-lime nature of its manufacture. In the vats it stank (although it was only many months later that I would really appreciate quite how much it stank), and it was hardly surprising then that the good citizens of the cities that benefited from

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the business were adamant that they wanted the factories on the most windward edges of their backyard.

The murex baths I saw were about the size of a dining table for six, and deep enough for a man to stand submerged to his waist (or a Phoenician man to stand submerged to his chest) in them—though if it had been me, only the abuses of slavery or a very large salary would have managed to persuade me to do it. They were lined with white stone, which looked almost like a classical version of concrete—crumbling around the edges. Far behind them were tall columns that the archaeologists had raised again to celebrate the extraordinary past of this city, but the murex baths were among the fallen columns. Even though they had been carefully excavated there was a sense—with their weeds and deliberate isolation from the “nice” parts of town—that they had been left once again to be forgotten.

When people in the nineteenth and twentieth centuries started to try to reconstruct the dyeing process of Tyrian purple they first looked to Pliny, who, after all, had visited the city in the first century A.D. so probably knew what he was talking about. The trouble is, the process was secret (and terribly complicated), and neither Pliny nor the others got the details quite right. He wrote about cutting out the vein of the murex, steeping it in water to which the equivalent of a kilo of salt to every 100 liters had been added, then after three days heating it, and after nine days straining it and leaving the wool to soak.¹⁷ The only problem was, it didn't quite work. In brief,¹⁸ the problem is that as soon as the shell is broken and the colorless liquid exposed to the atmosphere, it turns into the purple pigment—which is not soluble in water. In fact, despite its reputation, like indigo (to which it is chemically very closely related), shellfish purple is a pigment and not a dye. So, I wanted to know, how did the ancients fix it onto their clothes?

What I was more concerned with knowing immediately, however, was how to fix it onto my fishing line, and on my last morning in Tyre I met my fisherman friend again at the reception desk.

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Can we go out in the boat today? I wondered. He called his brother on his mobile, and sounded as if he were negotiating. “No,” he said eventually. “It is still too rough out there. My brother isn't risking going fishing today.”

So I went to the beach instead. I wasn't resting from my quest—this was a very special beach, the place where the mystery of purple technology was first revealed. Today the beach at Tyre is a perfect bay of white sand, fringed with beach huts and bars. But once, according to local mythology, this was the place where Heracles—whom the Phoenicians worshiped as Melkart and the Romans knew better as Hercules—went for a lonely and historical walk with his dog.

I imagined the demigod striding out in his lion skin, worrying about the labors ahead of him, and absentmindedly throwing a stick across the pure white beach for his demidog to fetch. And then I imagined the animal bounding up a moment later, wagging its tail, with dye dripping from its teeth, and the master, astonished by this extraordinary color, carefully picking a specimen of *Murex brandaris* out of its mouth. It was a mythical discovery that would not only solve any short-term Phoenician financial problems but—given that every toga demanded the death of some ten thousand murexes—in the long term would put several species of sea creatures on the nearly-extinct list.

Some versions of the story add a female love interest in the form of the nymph Tyrus, who—on seeing what she felt was the beauty of the dog's stained saliva—demanded that her boyfriend make her something equally beautiful, and so, as a Herculean labor of love, he obediently invented a special technique for dyeing silk. As if to illustrate the story I was imagining, a crowd of young Tyruses in tiny multicolored swimsuits suddenly rushed into the water and started giggling and splashing water over each other. A few meters away there were other young women swimming—but these were fully dressed, their headscarves and long-sleeved shirts drenched with salt water. They were also laughing and splashing, oblivious

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to the curious juxtaposition of two lifestyles on one beach. There is a story told locally of a U.S. army battalion storming the beaches in the 1980s, to rescue this Middle Eastern country from its tragic civil war. The Americans wore full battle gear as they rushed out of the water, but the only people there to witness their dangerous maneuvers were a few Lebanese ladies sunbathing in bikinis. It is hard to say which group was more surprised.

As I looked across the perfect sand to the almost perfectly still water, it was hard to believe that the sea was really too rough to go fishing. The Mediterranean is like that here, confirmed the man from whom I bought a soda. "It looks nice, but you have to be so careful." I had to leave that afternoon. It seemed I had been so careful I had missed my murex.

A DYE FADES

On the way back to Beirut I stopped for a while in the Phoenician port of Sidon, just half an hour north of Tyre. The purple had been called Tyrian purple, but it could as well have been called Sidonian or Rhodesian (indeed, at one point in the Middle Ages there could have been an English bid for a Bristolian purple after a seventeenth-century traveller found purple-giving mollusks on that estuary and scholars confirmed something similar was used on old French, English and Irish illuminated manuscripts¹⁹). I wanted to investigate a curious landmark I had seen on the street map of the city. It was labelled "murex hill," and it promised to be a mound of the mollusks that I had been looking for so unsuccessfully. I was hopeful of finding a broken shell or two to add to my growing collection of pigment souvenirs. It was mid-afternoon when I got there, and I drove round the tricky one-way system three times: up past the school, the apartment high-rises, the run-down cinema, and the locked Muslim cemetery, where I stopped and peered through the railings.

But to my dismay I found no sign of crumbling old shells or

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even any grassy Roman hillock. On the fourth circle I finally realized what was happening. The whole steep hill, with its roads and buildings and human headstones, was artificial, a gigantic graveyard for millions—no, billions—of tiny creatures that died to allow Ancient Romans and Byzantine emperors to be born—and live and reign—"in the purple." No wonder there were none left for me to find, I thought. They had used them all up.

Back in Beirut I reached the National Museum a few minutes before closing time. Once, not so long before, it had been at the very center of the line that divided the Christians from the Muslims in this troubled city. Most young Lebanese people had known it only as the place where the shelling started—until 1998 they had never seen the treasures that twenty-three years before had been hastily sealed in concrete where they stood, to protect them from the war.

There, dwarfed by the 3,300-year-old tomb of King Ahiaram which holds some of the world's first alphabetic writing, and overshadowed by the collections of Arab and Phoenician jewelry, was a small display case which held what I thought I was looking for. It was labelled "Tyrian purple," but when I saw it I nearly choked with surprise. Because it wasn't purple at all: it was a lovely shade of fuchsia. I suddenly wanted to smile. I had an image of Roman generals holding up their arms in triumph beneath suitably triumphal arches—clad from victorious head to victorious toe in pink.

Could this color, dyed onto a fluffy ball of unspun wool by a Lebanese industrialist called Joseph Doumet, really be the color of history and legend? The color I had been searching for? It is hard to know. Pliny mentioned several different murex colors, quoting another historian as saying "the violet purple which cost a hundred denarii a pound was in fashion in my youth, followed a little later by Tarentine red. Next came the Tyrian dye which could not be purchased for a thousand denarii a pound." The latter was, Pliny commented, "most appreciated when it is the color of clotted blood, dark by reflected and brilliant by transmitted light."²⁰ This,

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he suggested, was why Homer used the word for purple to describe blood. This pink wool in the National Museum—which I later discovered had involved tin as a mordant, to make the color stick—was not the color of clotted blood, or indeed of anything even vaguely like purple. It was very pretty, I decided, but it did not mark the end of my search.

In his book, *Color and Culture* John Gage finds the reasons for the purple cult of Rome and Byzantium “very difficult to define,”²¹ but he does have an intriguing theory about it. The Greek words for purple seem to have had a double connotation of movement and of change. Perhaps this is accounted for by the many color changes involved in the dyeing process, but it is also, of course, the condition required for the perception of luster and of lustrousness itself. It is a theory borne out by Pliny’s description of clotted blood. And as I have found with so many of the most valuable colors I have gone looking for—especially sacred ochre in Australia, but also the best reds and the velvety blacks and, of course, that precious metal gold—one of the most important elements of their appeal is the way they have shone. It has somehow lifted a color or a substance from the level of secular to sacred—as if, by reflecting back some of the pure light of the universe, it embodies something holy. Or wholly powerful, at least.

As I flew back home the next day it was hard not to be disappointed. Even though this was the “home” of purple, it seemed that, apart from the little shred of experimental evidence at the museum, there was almost nothing of this color left in Lebanon at all. As I had seen so symbolically in Sidon, it seemed that murex had been subsumed into the historical structure of this ancient-modern country, while on the surface it was nowhere to be seen. But a few days later I cheered up on learning of another seashell purple which was perhaps even as ancient as the Mediterranean version, but which, extraordinarily, seemed to have lasted right up until the end of the last century—and, if I was lucky, even to the present day.

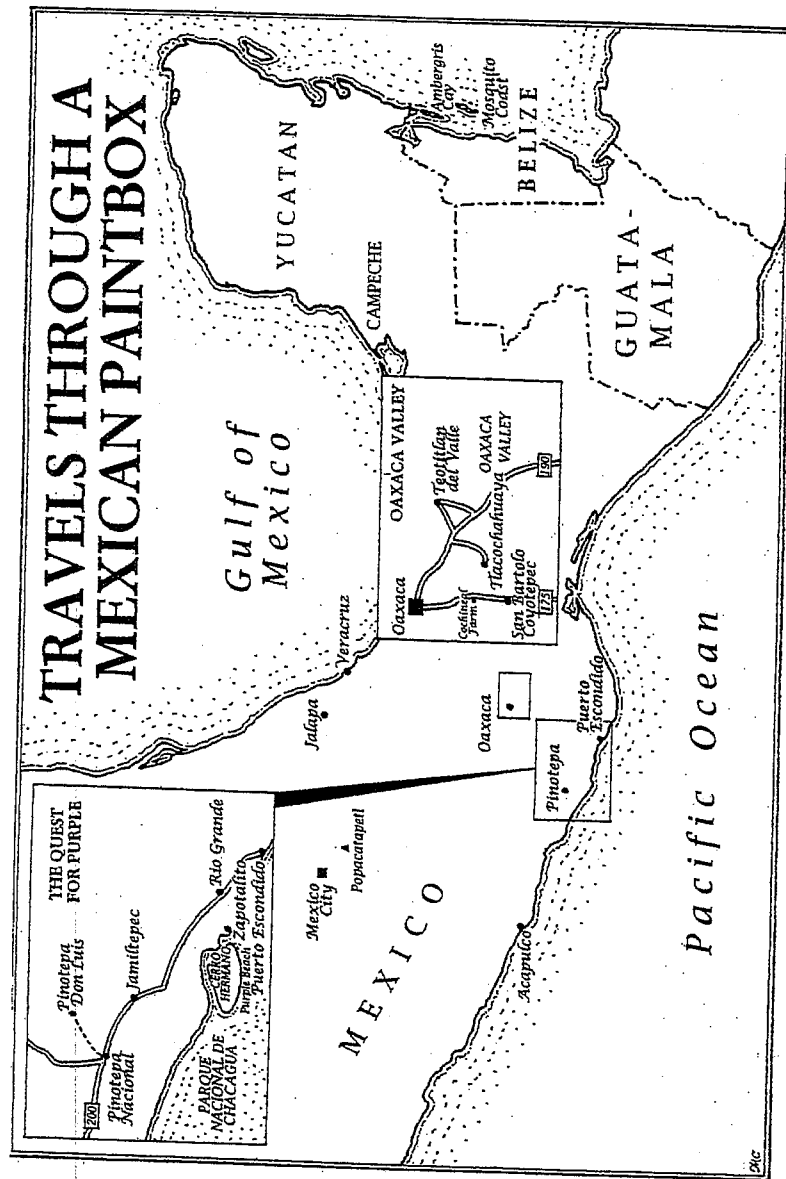
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THE PURPLE OF THE MIXTECS

In a description of their visit to Central America published in 1748, the Spanish brothers Jorge Juan and Antonio de Ulloa described how the dyers of Nicoya in Costa Rica extracted purple from shellfish. There were two methods. The first method involved pressing the poor animal “with a small knife, squeezing the dye from its head into its posterior extremity, which is then cast off, the body being cast away.” The second method kept the creature alive. “They do not extract it entirely from its shell but squeeze it, making it vomit forth the dye. They then place it on the rock whence they took it and it recovers, and after a short time gives more humor, but not as much as at first.” However, the brothers reported, if the fishermen got over-enthusiastic and tried the same operation three or four times, “the quantity extracted is very small and the animal dies of exhaustion.”

The ancestors of these Costa Rican dyers were the famous pearl-fishers of Queipo. Until about the seventeenth century they used to row to secret locations and then, clutching a heavy stone to their chests, they would sink down to depths of 25 meters or more to harvest their catch—holding their breath for at least three minutes. In 1522 Gil Gonzales de Davila, an emissary of the conquering King of Spain, visited the area, and found both pearls and purple, giving the area a double reputation for luxury. He brought back a dye sample of this *purpura* for the King, who gave it the grand brand name of New World Royal Purple, and, perhaps remembering the Roman precedent, demanded exclusive use.

In 1915 Zelia Nuttall, an archaeologist who was busy studying a series of ancient cartoon paintings made by the Mixtec people, made a visit to the Mexican seaside town of Tehuantepec. She was instantly struck by the purple skirts worn by some of the richer women in the marketplace, and, although she wasn’t a textile expert, wrote an article about what she had seen.²² Most women wore hand-woven “turkey-red” skirts with narrow black or white stripes.



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But the purple skirts that had attracted her attention were made of two widths of cotton, "united by a fine cross-stitching of orange or yellow," which—a little patronizingly—she decided revealed a sophisticated understanding of complementary coloring. They cost ten dollars: three or four times the price of the other skirts.

The skirts particularly intrigued her because of the way they echoed some of the pictures she was studying. These were a series of pre-Columbian paintings on deerskin, containing coded information about the people and the gods depicted on them in a very two-dimensional way. The British artist John Constable famously disparaged them, but then, as fans of the codex reassured themselves, in the same speech (which he gave to the Academy of Art in London in 1833) he pronounced the Bayeux tapestry to be almost as bad.

At that time they were owned by an English aristocrat—Lord Zouche of Harynworth—but they are now known as the Nuttall Codex. What Nuttall noticed was how the *purpura* skirt color was identical to a beautiful purple paint she had seen on the codex, painted more than four hundred years earlier. One page "contains pictures of no fewer than 13 women of rank wearing purple skirts, and five with capes and jackets of the same color." Even more striking, the codex also included pictures of eighteen people with their bodies painted purple: "in one case it is a prisoner who is thus depicted. In another a wholly purple person is offering a young ocelot to a conqueror, an interesting fact, considering that ocelot-skins were usually sent to the Aztec capital as tribute by the Pacific coast tribes." And in another it was the high priest—shown twirling fire sticks and performing a sacred rite—who was wearing a closely fitting mauve cap.

One of the weavers in Tehuantepec showed Nuttall a basket full of twisted and dyed cotton thread that had just been brought on mule-back from a town farther along the coast. "Lifting one of the thick skeins, [the weaver] slipped it over her brown left wrist, and proceeded to show how she, as a child, had seen the fishermen at

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Huamelula obtain the dye from the *caracol*, or sea-snail." Even by the time of Nuttall's expedition the caracols had become so scarce that the fishermen were having to travel farther and farther away, even as far as Acapulco, to fulfill the orders. "Although Tehuantepec matrons still consider one of these somewhat in the light that our grandmothers regarded a black silk dress, as associated with social responsibility and position, fewer and fewer purple skirts are ordered every year, and the younger generation of women favor the imported and cheaper European stuffs," she wrote. "Not more than about twenty purple garments were woven at Tehuantepec last year, and it is probable that before long the industry will be extinct."

Her prediction, she would have been glad to discover, was premature. In the British Library I found a brief academic monograph²³ that described a successful Mexican dyeing expedition ten years before. So, armed with several photocopies of the article, I set off with a friend for the Pacific coast of Mexico, hoping I was not a decade too late to find the mysterious sea snails that weep purple tears.

Popocatepetl, the volcanic guardian of Mexico City, was spewing forth its red anger as we flew down to Puerto Escondido, making for a bumpy journey. The volcano-fuelled turbulence had the unwelcome side effect of tipping a smelly cargo of fish over my bag. I had come to find sea creatures, and it was, I thought pragmatically as I double-washed my luggage, perhaps a good augur for my search that they had already come to find me.

Puerto Escondido means "hidden port," although in the past twenty years or so the place has been very much unhidden by the hordes of surfers and sun-seekers who descend every season, and evidently support whole families of T-shirt sellers. It is not a promising place to look for old traditions of any kind. A few boats go out to sea every night, arriving back at dawn for a fish auction on the sand, but most people there are outsiders, come to cash in on tourist dollars. A few locals had heard vaguely of the purple: Alfonso, a teacher of Spanish who we saw sitting open-shirted every morning at Carmen's coffee shop looking for new customers

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among the tourists, said he had heard the snails were sometimes known as "margaritas." My friend—a food writer who carried a compass to determine which location would be perfect for cocktails facing the sunset every evening—brightened visibly, but this was, apparently, nothing to do with salt around the edges of their shells. Alfonso wished us *mucha suerte*—good luck—in our search, and told us we'd need it. Later Gina at the tourist office reinforced the good-luck wish. "I think almost nobody does that dyeing anymore," she said. But she told us to look out for two local characters called Juan and Lupe, describing them as "Puerto Escondido's first surfers: still here, still hippies." I would recognize them by their black Labrador retrievers, she said, and by their red-blue hair, colored apparently with Mexico's natural sea dye. I imagined them as latter-day New World Hercules, walking their dogs along the beach and discovering purple. But during our two days in the town I didn't spot them. They were probably sleeping, Gina said.

On the third day we hired a white VW Beetle and set off into the interior. The coast may be where the dye is, but the dyers have often been from inland. In the old days, before there were buses, teams of men used to set off from their villages in the mountains every November to walk the 150 kilometers down to Puerto Angel. In their knapsacks there would be bleached cotton skeins entrusted to them by women in the surrounding area. The men would stay at the coast, slinging their hammocks between palm trees on the beach every night, until the rough early springtime weather made their search too perilous to continue. Every few years one or two dyers would die, swept out to sea by freak waves, but most would return home with their threads now permanently purple and reeking of sea garlic.

The first town we reached was Jamiltepec, about 60 kilometers from Puerto Escondido. According to my article it was there that Santiago de la Cruz, one of the last remaining dyers of Mexican purple, ran a small artisan shop. But when we asked, neither the shopkeepers nor the taxi-drivers had heard of Santiago or—more

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worryingly—of any handicrafts shops. Wondering whether we might have travelled halfway round the world for nothing, we ate lunch at a street-side *taquería* beside the Jamiltepec marketplace. News of our search had already travelled around the marketplace, and one of the many women crowding round to watch us eat said she knew someone who might have heard of Santiago. She called over an old man, who nodded and led us through the stalls until we reached a tiny shop. It was about the size of the Phoenician stalls I had seen in their ruined state in Byblos, although this one was concrete and wouldn't last the centuries. There was a woman there who was, promisingly, surrounded by shawls with mauve tassels. She told us Santiago was at home, but he would be at the shop in the late afternoon. Her name was Ofelia, and she was his sister.

We spent the time going into Pinotepa Nacional, a market town that houses many of the 350,000 Mixtec people in Mexico. It has a large covered marketplace—and it was there that I found the clothes I was looking for: the same purple, red and blue striped skirts, or *posahuancos*, that had so attracted Nuttall's admiration eighty-five years earlier. It was mainly the older women who were wearing them. Until recently Mixtec women used to go topless, but now they wear gaudy floral aprons to cover up. I asked an elderly onion seller whether I could take a photograph of her purple skirt. She shook her head, but then we both heard a chorus of disapproval from the butcher's shop behind us. Two young women who were working there spoke teasingly to her: "Go on, don't be a spoilsport," they seemed to be urging in Mixtec. So she shrugged and smiled for the camera, after which her young friends cheered.

In the late afternoon we made our way back to Jamiltepec. Santiago was sitting in his chair, embroidering a white shirt. He glowed with pleasure when he heard that we had come from Hong Kong to find him. "You are lucky," he said sternly. "I'm an old man. I could have been dead by now and then how would you find the *caracola*?" He was a young-looking fifty-one-year-old, but he had been ill with diabetes for the past eight years. "*Una tortilla per*

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día,"—just one tortilla a day—he groaned, shaking his head at the gastronomic tragedy. Santiago had become interested in the indigenous dyeing traditions sixteen years earlier, when he had first gone to find the mollusks, accompanying an old man who had once been one of the regular itinerant purple-collectors. Since then he had gone whenever he could. Local people thought he was eccentric, but he ignored them. He agreed to take us down to the purple coast the next day, although he warned we might have a problem getting a fishing boat to take us. "It is dangerous: we have to go with other people. One to find, and one to watch. People die doing this."

We met him just after dawn, and set off to the coast. As we drove he told us of the three colors of the *caracola* dye—a curious echo of the Mexican flag, though with a seashell rather than an eagle at its center. "First it is white," he said. "And then it becomes green, and then it finishes as purple or red, which we call *morado*." Because of the white, the process is called milking. In 1983 a Japanese company that called itself *Purpura Imperial* was given a contract by the Mexican government to collect purple for kimonos, he said. But they killed the snails rather than preserving them as the Mixtecs did, and eventually, after several years of lobbying by environmentalists, the contract was retracted and the Mixtecs were given the exclusive rights to dye with *purpura* in Oaxaca.

Japan has a long history of celebrating purple: violet has traditionally been the color of victory in competitions, it is the color of the cloth used by Shinto priests to wrap the most precious objects of the temple, and it is the color of the costume and tassels of the highest-ranking sumo referee. They call it *murasaki* (which sounds astonishingly similar to "murex"), and this was the adopted name of the author of the great work of eighth-century literature, *The Tale of Genji*, who called herself Lady Murasaki or Lady Purple. The Japanese had their own purple-giving shellfish—*Rapana bezoar*—but it was very rare and most purple was made with a plant

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from the borage family called *murasaki-so*—in English, gromwell.²⁴ It is hardly surprising, then, that they were willing to pay a fortune for Mexican purple. Although perhaps the company had not bargained for the diplomatic problems it would cause and clearly had not cared about the environmental ones.

At a police checkpoint we turned right, toward Zapotalito, where most inhabitants are the descendants of escaped African slaves who founded their own free communities on the Mexican Pacific. It is a dusty fishing village, lined with houses where pigs and chickens roam. Santiago stopped at one house, and came out a few minutes later, amazed at our luck. "There is never a spare boat," he said, shaking his head, "but today we have *mucha suerte*. My friend has been painting his launch, so he didn't go out fishing this morning. His son will take us out after breakfast." Santiago had been on about five purple expeditions with foreigners in the past decade. He remembered one couple who had accompanied him for the husband's research. They had taken one look at a local restaurant in Zapotalito and walked out, noses wrinkling in spousely unison, announcing that they could not possibly eat there because of the wife's delicate stomach. "Are your stomachs delicate?" he asked us. We assured him not, and we had a day of sampling excellent fresh fish—even for breakfast.

As soon as the tide was right we met the four boys who were to take us. They had green acrylic splashes on their bare feet from their boat-painting. We sped through the lagoon, past the fishing hamlet of Cerro Hermoso—Pretty Hill—and out into the open sea. Hold on tight, they said. The water was not rough, but I took hold of the seat politely. "No, really tight." And then, as we bobbed in the waves and waited and then bobbed a little bit more, I suddenly understood. A big wave rose up behind us, Fabian the driver thrust the motor to maximum, and we surfed in on its crest, landing with a judder on the white sand of a deserted beach, distracting a flock of vultures from their lunch of giant turtle.

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We headed toward the rocks, which fringed the coast for as far as we could see, and started looking, even though I was not very sure what I was looking for. Santiago was the first to find a *caracola* or sea snail: it was the size of a Matchbox toy car and, unlike the spiky Lebanese murexes, it was rounded and dark gray. He picked it up and blew on it. "Look," he said, and as we all gathered round it started to weep as if with fury at being removed from its rock. The tears swiftly became milky white, and Santiago rubbed it gently against the skein of white thread he had wrapped loosely around his shoulder. It was a simple way of getting over the problem that purple was a pigment not a dye: strictly speaking, Santiago was not dyeing the cloth—he was painting it.

As he had promised, it made a stain that was fluorescent lime green, which within a few minutes turned yellow and then purple, like a bruise. The dye is a naturally light-sensitive compound—the purple appears in reaction to the sunshine, otherwise it stays green. It is curious to think that this natural chemical compound could, if anybody had ever found a way of fixing it, have been used to make the world's first photographs. We could have inherited ancient photo-images of Aztec rituals or thousand-year-old baby pictures, all held in crazy hallucinogenic color contrasts with this organic dye. For a moment, as I took a picture of Santiago happily holding his little shell, I imagined the image developed as a violet wash, with lime-green spots where the shadows lay.

From our rock fortifications we could see a man with a snorkel far below us in the sea, diving down for what seemed ages. I was so impressed, I timed it: he averaged more than ninety seconds each time. I liked to think he was a pearl-fisher, following the traditions of his ancestors, although Fabian less romantically thought he was probably collecting lobsters. If the man looked up and spotted us through his foggy mask, we must have seemed a curious sight as well. Four boys, a man and two blonde women separating out among the spiny rocks, then clambering back to touch a piece of

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white cotton with a little shell, before moving away again. Occasionally a wave would drench us, and we would wipe the water from our faces as if crying.

We spread out along the rocks, enjoying the triumph of finding a particularly impressive specimen of *Purpura pansa*, of tugging the creature until it gave up its sunny bathing spot with a reluctant slurp, of blowing on it, then the wonder of watching the color turn on the thread. I wanted to take one, just one, home for my collection. "Here's one," said Santiago, holding an example at random. "You could put it back or take it." Put it back, I said, thinking rather greedily that it wasn't the biggest one. "That's right: leave it to live another day," he said approvingly. "The *caracola* are sacred: we believe it is bad luck to kill them," he added. I had had so much good luck that day I didn't want to risk it. I left them all.

With no skein over my own shoulder I instead set one *caracola* on my white nylon watch strap. It mottled quickly to bright purple, and smelled strongly of spring onions. For the next month I had to break the habit of thirty years and take my watch off at night, lest my dreams were too full of the sea. Even now, as I write six months later, I can still smell the garlic. Experts say that even with textiles a century old or more you can know if they were dyed with *caracola*—or murex depending on your continent—by rubbing them gently between the fingers and sniffing them. It is a funny thought that, even wafting clouds of jasmine and saffron perfumes, the emperors of Ancient Rome would probably have left a cloud of garlicky, fishy smells in their wake. Perhaps there were so many other smells in Rome that "eau de murex" was celebrated for its sophistication. Perhaps it was the scent of power.

I found a cave where the rocks were prettily stained with mauve: it must have represented millennia of snail trails. Suddenly I heard the brittle sound of shells cracking, and looked around. It was fifteen-year-old Rico, who, bored with searching, was throwing the used mollusks at the rocks. Santiago scolded the boy. Killing the *caracola* is what the Japanese people did—it is not the behavior of

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Mexicans, he said. "See how these people have come all the way from Hong Kong to see our purple: we have to value it."

We slung the skein over the boat. It made a good photo: the lilac threads against the green boat, with the amateur dyeing team standing triumphant behind, holding out our stained hands. But this, I had already realized, was not the purple that Pliny described, the almost-black that in the right light provides a glimpse of another color that we don't have a word for. This was mauve, lilac, lavender, whatever flower words one can summon. But it was not conceivably ox blood. Was there some mistake? Had we left out some critical step in the dyeing process (hardly impossible, as the dyeing process I had just witnessed must be one of the simplest ever devised)? In the eighteenth century the Ulloas had recorded that the cotton varied in weight and color according to the hour it was dyed—a finding that he had thought curious, but which had its echoes among the dyers of the Mediterranean. Perhaps, I thought, the ox-blood hour was later in the afternoon.

Back in Jamiltepec, Santiago invited us to see his home. It was a one-room building with a mud floor and two gray hammocks where he and his sister slept, separated by a curtain. The only pieces of furniture were a wooden chair and a sewing machine driven by foot pedals, with which he made artifacts for tourists. I promised to send him photographs, and a copy of this book. The other people who had come had always promised and never sent anything. "But it's another world, isn't it, for them," he said, both wistfully and wisely.

The next day we visited a hill town called Pinotepa Don Luis. When we arrived after 40 kilometers of muddy driving it was like shifting back physically in time: the only thing modern, it seemed, was us. The whitewashed village square was full of men in white, women in purple, all moving around chatting and selling things to each other. We parked and walked back with our cameras. But in those five minutes, and as if by magic, everyone had vanished. The whole place was empty except for a man quietly painting the

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cast-iron benches white, and I really wondered whether I could have imagined the earlier scene.

The mystery was solved twenty minutes later, when we found a curious restaurant in a back street. It consisted of strong wooden trestle tables and benches laid out under a canopy that crossed the street. On one side women stirred great cauldrons of coffee and terrifyingly fatty beef stew (at last, I thought, I had found the ox-blood color), heated by wooden fires. On the other side, in a garden, a dozen women were busy making tortillas in the old-fashioned way, on ancient metal plates heated by wood fires. We were invited to join in, and everyone laughed when our tortillas were full of holes. The more gregarious women beckoned us to sit and placed bowls of fatty stew and coffee in front of us. We offered to pay and they shook their heads firmly.

On the other side of the covered street there was an old man dressed immaculately in white, pulling pale cloth-like bits of inner cow from a bucket of offal, stretching them out. He was the village leader and he spoke no Spanish, only Mixtec. We felt we had either slipped a century or were on a film set. For a dedicated searcher of purple skirts it was heaven: almost all the women over forty were wearing them, although some definitely had an aniline look. Most of the women wore aprons, but one septuagenarian, tending her cauldron in the background, was bare breasted in the old style. "Is it always like this?" I asked a friendly-looking young man on the next-door trestle table. "Oh no," he said, with a broad smile. "This is my wedding."

After we had got over our horror, he introduced me to his friend's mother, Elvira Leyva, who he said might be able to tell us about the significance of the stripes in her skirts. I had been told the patterns of blue, red and purple in the weave might vary, depending on what village it was made in. "No," she said, laughing. "The stripes don't matter, we just choose the design we like." She owned five *posahuancos*, which she wore in succession, with one kept back for "best." She could remember her own mother giving

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yarn to the itinerant dyers, who would go down to the coast, and return a few months later having "painted" the thread. "That doesn't happen much anymore: most of these are synthetic." It was a shame, she said, as the more you washed the old *posahuancos*, the better the purple color became.

Elvira had never worn any other clothes, and laughed when I asked whether she got tired of them. "The people who wear it, we wear it forever," she said. She was sitting next to a woman dressed in black, who was introduced as her *consuegra*, the mother-in-law of her child. They were the same age and had gone to the same school, but one had worn only Spanish clothes, the other only Mixtec. "It's always been like that in Pinotepa," Elvira explained. "Some people do wear purple, and some people never do. The Spanish people never do."

One of the never do's is her own daughter, who is in her early twenties and has never worn a purple skirt in her life, not even when she was little. "She didn't want to," Elvira explained. Did Elvira also feel it was a shame that the custom would end with her generation? She laughed. "Oh no. My daughter is independent. She can do as she likes." Then she added: "I'm not sad at all. This is just the way life is; things change."

THE SECRET OF TEKHELET

Sometimes you travel a long way to find something, and yet when you find it, it is closer to home than you think. That's what happened to me with "Tyrian" purple. I thought I would find it in Tyre, and I found only empty vats and a steep hill built out of seashells—and even the fragment of dyed wool I saw was not purple at all. I then thought I would find it in Mexico, but although I was entranced by watching that transparent stain turning mauve in the sunshine, I knew the Romans had used a different method.

In England I met a dyer called John Edmonds. I contacted him because I had heard he had experimented with two hundred

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different dye recipes (including woad) for a project at the Chiltern Open Air Museum—and he ended up helping me on my indigo quest. But what really fascinated me were more recent experiments he had done with a quite different kind of blue—a seashell color that was used to make the sacred tassels on the Jewish *tallit* shawl. Its story is one of loss and rediscovery—several times over.

Here was the problem. According to the Torah—the first five books of what Christians call the Old Testament—God told Moses to tell the Israelites to make “fringes in the borders of their garments [and] put upon the fringe of each corner a thread of blue.”²⁵ The Talmud, which is the book of Jewish laws, went farther and specified that the blue had to come from a special source. It was vague about exactly what that source should be, although it was emphatic that it should be from a particular kind of sea creature with a shell.

The purpose of the fringe and the shawl are to remind Jewish men of their sacred responsibilities. The twelfth-century sage, Maimonides suggested the blue was “similar to the sea which is similar to the sky which is similar to God’s holy throne.” Another explanation from a modern-day commentator²⁶ suggests that the white on the *tsitsit* represents logical things, and blue represents mystical things, and only together can they fully remind us of the wonders of the universe. Whatever the symbolism, all these color-coded reminders were forgotten in around the seventh century, at the time of the Muslim conquests. It had probably been the exclusive domain of Jewish dyers to dye these sacred fringes—non-Jews were probably not trusted not to use indigo—and none of them had thought to write the formula down for posterity.

So for 1,300 years the Jews had no blue in their *tsitsit*, or if they did have blue, then it was the wrong one. But then Perkin’s discovery of coal-tar colors began to stir long-forgotten memories.²⁷ Inspired by the new dyes, a Rabbi Leiner in Poland decided to do some investigations into the old ones.²⁸ Leiner’s theory was that the “*hillazon*,” mentioned in the Talmud as the source of the *tsitsit*’s

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proper blue, was a squid, and in the 1880s he was delighted when chemists showed him that it was indeed possible to make a very fine blue from squid sepia—by adding a few iron filings to the brew—and within a few months thousands of Jews were wearing blue sacred threads.

But there was a problem with Leiner’s recipe—a problem that was not discovered until 1913, when a London University student decided to make this the subject of his postgraduate thesis. Isaac Herzog was no ordinary student—he would later become the first Chief Rabbi of the State of Israel, and his son Chaim would become its President. And he was fascinated by the problem of purple, especially after sending some of Leiner’s dye to the laboratory, only to find to his amazement that it wasn’t even organic. In fact, the laboratory told him, he was in proud possession of an excellent example of Prussian blue. The squid wasn’t essential at all for the dyeing; the color depended far more on the iron filings.²⁹

Over the years Jewish scholars experimented with other species. The problem they faced was that however they put the pigment from the shellfish in the vat, everything usually came out purple—and although the Hebrew word *tekhelet* can suggest both violet and blue, they were convinced the historical color veered much more toward the latter. In 1908 a scientist called Paul Friedlaender discovered that imperial purple is chemically very closely related to indigo: no wonder the early Jews had so much trouble telling the two apart.

Then, in the 1980s, a chemist called Otto Elsner noticed something else extraordinary. He observed how dyeing done on a sunny day came out blue—but on a cloudy day it was purple. This seemed to provide part of the answer the Jews had been looking for. Elsner had established that it was indeed possible to get blue from purple by involving a photo-chemical reaction—and his discovery had the additional theological neatness of embracing something holy that was, like the world itself, born of light. But Elsner had used modern chemicals in his experiments, and he and his

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see why the good people of Tyre had put up with their olfactory suffering. Because there, like little miracles of the dye pot, were examples not only of a vivid purple, as bright as anything Perkin created, but of a sky blue from the same source. There in that smelly room was the legendary Tyrian purple—the symbol of power and greed and luxury that I had chased around the world to find. And next to it was its bluer twin, which had the same constituent elements but with a little sunlight mixed in with them as well, to remind the Jews not to forget the more mystical side of the universe.

Perkin's extraordinary discovery of modern dyes that day in 1856 had—years later—resulted in rediscoveries of how to make two of the oldest, and most revered, colors in the world. As with so many stories in my historical paintbox, it turns out that the old secrets were not lost after all. They were just waiting for someone to discover them again.

EPILOGUE

The End of the Rainbow

How many shades can a walnut be? What is the color of a healthy liver? How can you describe the ideal organic strawberry to a buyer on the other side of the world? What shade do you want your car to be? Or your hair? Or the sapphire in your engagement ring? How can you measure the color of pies? Writing and researching this book have shown me how hard it is to describe color—to explain the gleam of insect blood or the natural luminescence of a piece of precious Chinese green-ware or the ruby-like resonance of a glass of saffron tea. So I decided to end by meeting someone who had made it his business to do just that: work out how to describe the exact shade of a color to somebody halfway across the world.

Lawrence Herbert is sometimes called the Color King. "Or even the Color Magician," he volunteered, when I met him at the Pantone color palace in a sprawling piece of industrial greenbelt just off the New Jersey Turnpike. Herbert's mission in life—ever since he took a temporary job at a small and ailing printing company (which produced color charts) in 1956 and bought it out within six years—has been to create an internationally accepted standard of colors. "My dream was that someone should be able to call a supplier in California from their home in Acapulco and say I'd like to buy rose pink paint, or whatever. And that when it arrived it was exactly right."

In the natural world—where the color of an ochre might depend on the exact place where it was mined, or where an "indigo" dye could be dozens of different shades, depending on the dipping time, the alkalinity and even the sunniness of the day—making

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colors has traditionally been an imprecise although often highly symbolic activity. But at Pantone, which has grown to be the biggest color-specification company in the world, color is all about precision. Herbert and his colleagues started by dividing the world into fifteen basic colors, including black and white, making up about a thousand shades. He later introduced even more elaborate systems, including colors with evocative names like wood violet, moss tone, sulphur spring and doe. Pantone sells the basic "catalogue" in fan-like books—and if you have one and your contact has one, then you can both know exactly what shade you are talking about. It started off as a service for printers, but the expanded system has proved to have a myriad of uses.

Pantone color standards have been used for renovating the tiles in the mosaics of San Marco in Venice, for giving official definitions of the colors used in national flags, including the Union Jack and Japan's Rising Sun, and for measuring the color (and sometimes therefore the quality) of gemstones. But one of the company's proudest innovations does not have to do with art or heraldry or jewelry but with medicine. "We've just developed cards that can identify the fat content of a liver by color prior to a transplant," Herbert told me. The cards have already saved lives by cutting down on rejection rates. "Previously measuring color was based more on art than on science. Now we can be exact."

The oddest color-matching job he had ever accepted was a commission from a goldfish breeder to calibrate the different colors of the shimmering koi that are so valued throughout Asia. "About twenty fish arrived in little bags, and I put each of them into a tank and moved them around until I'd put them in some kind of arrangement in terms of color," he remembered. How would you assign names for twenty shades of fish, I mused, thinking of the famous story about the Inuit of Canada distinguishing between dozens of shades of snow¹ (a story which is apocryphal but which has captured so many people's imagination that it is a phenomenon in itself), or of the amazing statistic that in Mongolia there are

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more than 300 words for the colors of horses. "We won't do names anymore," he said. "In the next round we're eliminating them."

I felt a little like John Keats, appalled at Newton's audacity in taking the magic out of the rainbow. "But the names of colors are history," I said, thinking of how mummy brown and ultramarine and Scheele's green and Turner's yellow and so many color names hold entire histories of deceit and adventure and experimentation in their syllables. "But we are dealing with science and measurement," he explained patiently. "This is a digital world now, and computers don't need names but numbers. People talk about 'barn red' but they never saw a Scandinavian barn in their life. And what does 'lipstick red' mean anyway?"

Today we can have our houses and our cars and our clothes any color we like—without any reference to nature or to anything more symbolic than the fashion world's decisions about what colors are "right" for next season. And so perhaps it is not strange that we do not seem to need or even want to be reminded of their history anymore. I could understand what Herbert was saying—he needed to adapt to new demands from the computer and Internet market—but I was relieved that I had encountered him toward the end of my researches. And I felt glad that I had made my paintbox journeys when I could still explore worlds of approximation and poetry, before the colors began to lose their words.

When I was two days from finishing the first draft of this book, a friend called from New York in great excitement. "There's a text message on CNN. They say someone's found the color of the universe," he said. And what color is it? "I'm not sure, I missed it." He left the TV news running as we talked, and then suddenly he said: "Here it is again." I grabbed my pen and wrote down that scientists at Johns Hopkins University had discovered the color of all the light in the universe. And that it was pale turquoise.² I had no idea what it meant, but it suggested that my journey was not over. And that there was a whole world—no, a whole universe—of color stories still to find.