Cooking Up Color

Every thought experiment needs a guiding question, a frame to cage its potential chaos, so here is ours: What is a “color recipe,” anyway? At its most literal level, we’re talking about a set of instructions for making colored dyes and paints, but already that jumps too far ahead.

Take it more slowly, then, in its various parts: What is a recipe? Recipes, at least, we all know and recognize through a shifting kaleidoscope of definitions. The Oxford Encyclopedia of Food and Drink in America offers a handy starter concept: “the ideas and instructions for handling foods and preparing particular dishes.” In a 1989 article much cited by later food scholars, Susan J. Leonard widens the aperture a bit: “Like a story, a recipe needs a recommendation, a context, a point, a reason to be. A recipe, that is, is an embedded discourse.”

Robert Appelbaum takes an even wider angle on a recipe’s purview: in addition to all of the above, recipes are products of shifting patterns in the organization of households, the definition of regional and ethnic identity, the practices of gender construction, the spread of literacy, the promotion of professional medicine, and a variety of other social, cultural and even political phenomena. Just about any cookbook, as Roland Barthes was among the first to observe, can be seen to adopt a certain cognitive style, a certain grammar and semantics of food. This commentary jives nicely with linguists’ categorization of recipes as a kind of “procedural discourse,” like driving directions or instructions for assembling furniture from IKEA. (Procedural discourses are infamous for the glimpse they offer into someone else’s imaginary landscape—sometimes pin-bright in its organized efficiency, sometimes revealing a shambling, appalling mess.) For my money, M.F.K. Fisher nails the definition of a recipe that best straddles its interdisciplinary nature: “A recipe is supposed to be a formula, a means prescribed for producing a desired result, whether that be an atomic weapon, a well-trained Pekingese, or an omelet.”

Clearly, the concept of “recipe” offers lots to unpack. What, then, is color? Just as sprawling a subject, color offers a brilliant, immensely diverse jumble of definitions of its own. Its enormity of selves, in fact, is legion. “Colors are the deeds and suffering of light,” wrote Johann Wolfgang von Goethe in his 1810 seminal work Theory of Colours, a hearty (if scientifically inaccurate) rebuttal of Sir Isaac Newton’s prismatic theory of the color spectrum. Modern scientists define color as the nervous excitation of light waves acting on objects—rather, it’s our perception of this sympathetic vibration between light and object that we call color. “Colored objects are illusions, but not an unfounded illusion,” writes the philosopher C.L. Hardin, tidily summarizing the heated debate color sparks in realms of semiotics, epistemology, and phenomenology.

The Bauhaus artist Josef Albers was both blunter about color and more oblique. “Color deceives continually….In visual perception a color is almost never seen as it really is—as it physically is. This fact makes color the most relative medium in art.” Barthes captures color’s emotional pull, its power to induce swoon: “color is…a kind of bliss…like a closing eyelid, a tiny fainting spell.” Color is impossible to shoehorn, but if you could cram its meaning into a single sentence, you could do worse than this one: color is a tricky

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trialogue among light, an object, and your eye, critical to visual perception (and implicated in a lot of misperception), rampant across nature, science, spirituality, art, in every culture, every era, and every language. Shifty, ubiquitous, and uncontrollable, color is a daily mystery we all swim in.

Whatever other penumbral qualities it may possess, color is also stubbornly material. If you could leach a room of all its colors and bottle them, what would you get? Paint peels off the walls; stains lift from wood in translucent amber ribbons; dyes scintillate back into their stoppered bottles. In one corner you’d have a faintly disappointing collection of paint buckets and dark teardrop-shaped bottles of dye: objects whose other physical qualities are overwhelmed by one property, their ability to impart color. These materials don’t seem like wax or lead or suspended particles in resin, although they qualify as all of these. Rather, they just seem like pure color—created, as it happens, via a centuries-long evolution of their recipes, a tradition that starts as kitchen-sink experiments and alchemical pottering and matures in sparkling-modern industrial chemistry labs.

Manufacturing colorants was once extremely big business—and the industrialization of that business turned out to be a stonkingly complete success. Thanks to a phalanx of industrially produced dyes, pigments, paints, and food colorings, color is now not a factor in the cost of most products. Take any machine-knitted sweater, in inviting retail stacks of purple, yellow, and dun brown: each color sports the same price. An ordinary wonder like this would have stupefied dyers’ guilds of any century before the Industrial Revolution. Medieval color makers would have relegated dun brown to the discount rack, with brilliant purple featured in costly splendor up front. (Yellow’s price tag would show added or subtracted zeros based on the color’s brightness: strong canary and highlighter yellows rating as most expensive, milder biscuity shades coming cheaper.)

Mimicking the historical arc of agribusiness, industrial color pushed toward lowering costs and ramping up desirable qualities like vividness, safety, and durability. Unlike the many modern gripes surrounding factory-farmed food, however, industrial color has largely achieved its production goals while rousing almost no cause for complaint. Color today is cheap, abundant, mainly safe, and long-lasting, a product boasting all the benefits of mass manufacture while somehow escaping soullessness. Industrial color’s victory is so total, in fact, that the British painter David Batchelor wrote an entire book, *Chromophobia*, limning an odd inversion of history: whereas rare, gaudy colors derived from nature were once prized by the rich, these same too-bright, all-too-available colors rendered synthetically now signal trashiness.

Other than a convenient overlap in terminology, do recipes for color and for food really have all that much in common? Surprisingly, they do. The history of color recipes illuminates the story of the struggle, and ultimate triumph, of industrial color. Like material histories of cuisine and
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Gastronomica

food styling by linda lundgren/
agent bauer. art director lars lengqvist/
locomotiv. photographs by pelle lundberg

© 2007 the robes of Roman leaders. Less well-known but just as evocative, cuttlefish emit an inky brown stain—the original source of sepia ink—when they’re afraid.12

The biggest pile of ingredients heaved onto our table would be the rocks. You’d start with chunks of ochers, capable of rendering various colors from reds to yellows to browns and blacks; lapis lazuli, the semiprecious stone coloring ultramarine paints prized by medieval and Renaissance painters, plus smalt, a cheaper blue; malachite stones for greens; and lead, a dull mineral from which, paradoxically, red and the finest painter’s white can be coaxed. The final pile of color ingredients groups the less easily categorized detritus of civilization: lampblack for dark shades; rusting copper sabers, hung over a well for a month to produce verdigris green;13 arsenic crystals, cooked into a poisonous rainbow of hues, from greens to yellows.

How else can you sort them, if not by kingdoms of animal, vegetable, and mineral? Costliness, a term understood by coupon clippers, springs to mind as one organizing principle. Like the flamingo tongues the Roman gourmet Apicius supposedly favored, working with expensive ingredients signals the cook’s unmistakable intent to produce quality results. As such, a true mark of appreciating fine ingredients is often a simple preparation—often in contrast to the herculean labors required to obtain the ingredients. Saffron stigmas, a rare modern colorant that still resists mechanization, must be plucked from crocus flowers by

The Ingredients

Lay them out crisply on a table, for sorting, stacking, and chopping into color. First, let’s consider plants that yield usable dyes and pigments: beets, spinach, red onions, walnuts, pomegranates,11 and turmeric. The edible plants, however, rank as only minor players in the history of dyes and pigments. The cash crops of color, largely indelible, deserve their own pile: madder and saffron (producing yellow), woad and indigo (yielding blues), oak galls (for making black inks), buckthorn (to dye things yellow and green), jackfruit (for orange), and brazilwood (producing both red dye and, more notably, the origin of a country’s name).

You could further sort color’s ingredients into another pile, of insects and other lowly beasts. Cochineal beetles are still used to render a flaming galaxy of different reds. Murex snails are justly famous for the royal purples staining...
hand. A single ounce of Tyrian purple dye required killing a quarter million snails; dyeing a single toga cost ten thousand snails alone. Cennino Cennini, the author of the fifteenth-century artists’ handbook Il Libro dell’Arte, describes the mixing of humbler pigments in terse one-liners but devotes a florid three pages to a more exalted subject, “On the Character of Ultramarine Blue and How to Make it.”14 His almost tenderly worded instructions make it clear that ultramarine rated as the white Alba truffle of pigments:

Ultramarine blue is a color illustrious, beautiful, and most perfect, beyond all other colors...and, because of its excellence, I want to discuss it at length, and to show you in detail how it is made....To begin with, get some lapis lazuli... Pound it in a bronze mortar, covered up, so that it may not go off in dust; then put it on your porphyry slab, and work it up without water. Then take a covered sieve such as the druggists use for sifting drugs, and sift it, and pound it over again as you find necessary...When you have this powder all ready, get six ounces of pine resin from the druggists, three ounces of gum mastic, and three ounces of new wax, for each pound of lapis lazuli; put all these things into a new pipkin, and melt them up together. Then take a white linen cloth, and strain these things into a glazed washbasin. Then take a pound of this lapis lazuli powder, and mix it all up thoroughly, and make a plastic of it, all incorporated together...15

Cennini goes on to describe a minimum three-day kneading process, with hands coated in linseed oil, followed by repeated baths in lye, which coaxes out the blue dye.

Excesses like these train another lens on the ingredients of any recipe, the question of their sustainability. Extravagance, after all, often simply celebrates the ability to waste. While most preindustrial color making suffered from inefficiencies by definition, some ingredients stand out for their emphasis on squander. The Phoenicians slew billions of snails to empurple Roman nobility; Mexican dyers use a much more sustainable process, milking living snails repeatedly of a dye known as caracola.16 Nitrogen-hungry woad plants suck the soil dry of nutrients, requiring French dyestuff farmers to deplete an ever-widening circle of farmland, sowing the seeds of destruction and blue in their wake. Making red from cochinille beetles sounds initially as wasteful as slaughtering murex snails for purple. However, cochinille beetles live in a clever symbiosis with their host plant, the nopal or prickly pear cactus, allowing for a much more sustainable harvest than Porphyrophora polonica, or St. John’s blood, another parasitic insect harvested to make red dye. St. John’s blood lives on the roots of the scleranth plant, which must be uprooted, cleaned, and stripped at harvest—all for a measly forty insects per root—frequently killing the plant in the process.17

Any cook worth her salt views ingredients through the essential filters of quality and fitness to an occasion. Blending the worlds of food and color, Cennini advises using yolks from a town hen’s egg to paint the “cool fresh flesh” of young people, “because those are whiter yolks than the ones which country or farm hens produce; those are good, because of their redness, for tempering flesh colors for aged and swarthy persons.”18

Talking of quality, of course, also raises an inverse specter: cutting corners. Just as wartime housewives stretched coffee with chicory, pigment makers (called “colormen” to the trade) developed their own cheats for extending precious color supplies. Saffron dealers tricked unwitting buyers by weighing down their saffron with lumps of butter, or they dyed the useless yellow stamens red to resemble the female stigmas actually useful in dyeing.19 Unscrupulous colormen cut their paints with extenders like gypsum or chalk, added wax to increase its bulk, and increased the proportion of cheaper oil to precious pigment.20

Cheating begat countermoves by customers to check the quality of their purchases. Patrons in preindustrial Europe routinely spelled out the exact pigments to be used in their commission contracts with artists. Purple cloth dyed with authentic murex should smell pungently of spring onions; a quick rub of even century-old fabric will release the fragrance again.21

The Cook

Any recipe can be read as a personal message from the cook, an invitation to do as he does. As such, recipes usually bake in hints, suggestions, admonitions, and values—what Appelbaum calls the “language of suasion.”22 Interleaved between lessons on tinting drawing paper and sketching with charcoal, Cennini inserts chapter 29, “How You Should Regulate Your Life in the Interests of Decorum and the Condition of Your Hand; and in What Company; and What Method You Should First Adopt For Copying a Figure From High Up.” (He allows artists some “light wines” but otherwise hews toward a monastic lifestyle.) Eric Hebborn opens The Art Forger’s Handbook—his book of color recipes and other lessons from a master forger—with an airy, self-justifying quote from the sixteenth-century German humanist Sebastian Franck: “The world wants to be deceived, and so it is.”23

Editorial comments and value statements aside, where cooks reveal their most intimate selves is in their secrets. Referencing food recipes, Appelbaum writes: “The art of cookery depends upon a ‘secret’: the literature of cookery...
A cook who indulges in such covert and destructive vanity as to leave out one ingredient of a recipe which someone has admired is not honest, and therefore not a good cook. He is betraying his profession and his art. He may well be a thief or drunkard, or even a fool, away from his kitchen, but he is not a good cook if he cheats himself to this puny and sadistic trickery of his admirers, and no deep-fat kettle is too hot to brown him in.\footnote{26}

Color makers blew hot and cold when it came to unveiling their trade secrets. On the close-fisted side were Spanish traders, who profited handsomely from the sixteenth through the eighteenth centuries by keeping the rest of the world in the dark as to the exact source of their cochineal red dye. Pliny’s \textit{Natural History} refers to cochineal and kermes beetles as a “wormberry,” a fabulous creature that somehow morphed between animal and fruit.\footnote{27} Renaissance-era Spanish traders fully exploited this vagary to cloak their precious New World beetles in mystery.

Given the tremendous fortunes made and lost in color, it is remarkable how many colormen freely gave away the store in published cookbooks. Then again, authors of tomes like Pliny’s (from the first century), \textit{Mappae Clavicaula (The Little Key of Painting, from the ninth century)}, Cennini’s \textit{Il Libro dell’Arte} and Theophilus’s \textit{De Diversis Artibus} (both from the twelfth century), \textit{Secrets concernant des artes et métiers} (Secrets of the Arts and Crafts, from the turn of the nineteenth century) among many, many others wrote their recipe books for fellow tradesmen. Colormen, painters, and dyers formed a decidedly downstairs lot from the upstairs clients who consumed their wares. This privacy, incidentally, afforded cover for certain dastardly aspects of color: an unsavory trade distilled, boiled up, and reduced to a fine savor.

**Preparation**

Color preparations fall into categories broadly analogous with transformations food cooks already know well. There’s the Hummus-Natural-Peanut-Butter-and-Dips approach, which consists of grinding a colorant (usually a mineral) into a fine powder, then suspending that pigment in a colorless liquid to make it spreadable. Boiling a plant until a colorant is released is a classic method, as is reducing a liquid colorant into a useful dye or ink. You also have the Churning-Milk-into-Butter model, in which you subject a colorant to a process yielding different colors if you stop it at different points. But most color recipes got written down for the same reasons a food recipe did: namely, to capture a multistep process too complex to remember instinctively.

Color preparations boast their own dirty secrets, well-hidden behind the swinging kitchen door. An example of how the sausage gets made: gorgeous, costly colors often emerged dripping from their vats amid the acrid stink of urine and excrement. Lead white paint provides a case in point. Produced according to Pliny’s first-century recipe until Rembrandt’s time, workers put shavings of lead over a bowl of vinegar until lead carbonate deposits formed, which were then powdered, flattened into pigment cakes, and dried in the sunshine. The Dutch “stack” process accelerated matters. Steaming vats of manure, placed in proximity to the lead and vinegar, “produced not only the heat to evaporate the acid but also the carbon dioxide to transform the substance from lead acetate to lead carbonate,” as Victoria Finlay explains.\footnote{28}

Stale urine (and its byproduct, ammonia) provided a cheap, plentiful reducing agent for woad and indigo dyeing in blue. Scottish housewives and Pompeiian dyers alike kept urine vats handy at doorstep and hearth for willing donors.\footnote{29} Urine supplied the chief ingredient of the painter’s pigment Indian yellow—specifically, the urine crystals of cows fed entirely on mango leaves, a diet that rendered cattle haggard (and spun the wheel of nirvana backward for the Hindu farmers poisoning their cows this way).\footnote{30}

The most suspect color recipe, that of Egyptian brown, combined repulsiveness with amorality. Also called “mommia,” its colorant was none other than crushed mummy remains, an ingredient that was by definition in finite supply. In an attempt to rectify this deficiency, in 1691 William Salmon provided a recipe for making one’s own artificial mommia:

\begin{quote}
Take the carcase of a young man (some say red hair’d) not dying of a Disease but killed; let it lie 24 hours in clear water in the air: cut the flesh in pieces, to which add Powder of Myrrh and a little Aloes, imbibe in 24 hours in the Spirit of Wine and Turpentine…
\end{quote}

Think of the crush of browns tinting northern Europe paintings throughout the seventeenth century, and it’s dazzlingly disgusting. I hasten to assure you: innocent Vandyke brown, umbers, sienna, and ochers colored that era more than mommia ever did.

The preparation stage in many recipes can be fraught with doubt. How can this mash of egg against flour, cut with rivers of milk, transform itself into bread? Faith is
tested, but—more to this atheist’s liking—what’s truly tested is a recipe’s underlying soundness as chemistry. Like food recipes, particularly for baked goods, shepherding a chemical process was often critical to successful results. Take turnsole, also known as folium or morella. This plant extract (chemically, Crozophora tinctoria) yields a red dye when bathed in acid, purple when immersed in a neutral, and blue, with alkali. The juice of red cabbages and litmus—an extract of a Scandinavian lichen—also behave this way.31

Making food is often a matter of chemistry-in, chemistry-out. That is to say, its chemical structure transforms in the gut tract into nutrition and, very often, a specific pharmaceutical effect. Colorants are no different; in fact, in their role as pharmakon the parallels between color and food become downright uncanny. Not only did pharmacists dispense colored dyes and paints, they also recommended colorants for remedying physical ailments beyond simple drabness. Pliny’s Natural History is rife with remedies using colorants: he suggests the brown pigment sinoper, for example, against ulcers, looseness of the bowels, and, “applied in a burnt state, with wine in particular, it has a desiccative effect upon granulations of the eyelids.”32 Ochers were considered astringents; yellow madder was used to treat jaundice; red hematite, to help blood clot.33 While many of these remedies sound notional today (yellow dye treating a yellowing disease and so forth), other folk uses for colorants stand up to scientific scrutiny. The wood blue smeared by ancient Britons on their skin before battles acts as a natural antiseptic against future wounds.34

The flip side of any pharmakon, of course, is its potential to poison. Arsenic-based pigments like yellow orpiment, lead white, and Scheele’s green (which was famously fingered for, and later acquitted of, killing Napoleon via his bathroom wallpaper) could all kill as readily as other pigments might cure.

**Ta-da! The Results**

Bring forth the redolent stew, the perfumed loaf, the steaming heaven of a laden casserole dish. Eventually, the kitchen’s mess, the cook’s secrets both craven and clever, all that sweat labor are swept away, and dinner is served. We eat for nourishment; we hope for pleasure. But our finest hours consuming food or color catapult us into another realm, that of transformation. When ingredients are so magically sublimated, so hard to finger, the result incarnates a certain divinity: proximity to actual creation.

Food’s deliciousness and color’s startling beauty are obvious goals of any recipe (and, also obviously, parallels to each other). Yet our cravings run deeper. Like rituals of sharing food, color also feeds us spiritually, revealing the recipe’s potential as an incantation of sorts. Let’s just draw out a few brilliant scraps before we settle in for the feast. Alchemy, color making, and chemistry all bled into each other as overlapping pursuits in the Middle Ages.35 Color’s use as a potion ranges from well-grounded religious practices—Jews meditating on their blue-fringed prayer shawls—to nuttier incarnations in the present, like the Essene Fellowship of Peace, a cult that uses color meditation to bind its followers with God and the world. (Sample advice: cure a poisonous snakebite by gazing on silvery ice blue and lavender, or think about burnt orange to avoid slipping on ice or a loose rug.)36 Modern science admits that color does act on us cognitively. Clinical psychologists love to pit red against blue, with surprisingly consistent results: teams in red Olympic uniforms usually trounce those clad in blue; red covers on IQ tests can make us antsy enough to drag down scores.37

In a word, both color and food are cagey, substance and ether. Like an elusive taste, color can resist description; like a tea-soaked madeleine, color can draw us inductively into another world: *ins Blaue hinein*. It’s a quietly extraordinary fact that color and food can actually be made, not just conjured—and here are the recipes as proof, crumpled but still legible:

**NOTES**

9. Don’t don your jetpack and rose-colored glasses for a 1950-style Better Living through Chemistry moment just yet. Synthetic dyes are not without problems. Modern dyes are largely derived from petroleum, hardly a sustainable resource. And researchers at Southampton University in England have linked synthetic dyes to hyperactivity in children, prompting a regulatory push by the European Union to shift toward naturally derived food dyes like those found in purple carrots,

On the American side of the Atlantic, the Center for Science in the Public Interest issued a 2010 report fingerling the three most common synthetic food dyes—Red 40, Yellow 5, and Yellow 6—as contaminated with known carcinogens. The report also points out that Red 3 has been identified for years by the Food and Drug Administration (FDA) as a known carcinogen but continues in free use in the nation’s food supply. See Sarah Koblenski and Michael F. Jacobson, “Food Dyes: A Rainbow of Risks,” Center for Science in the Public Interest, 29 June 2010, http://cspinet.org/news/20100602red.html (accessed 21 March 2011).

10. David Batchelor, Chromophobia (London: Reaktion Books, 2001). Batchelor summarizes the book’s subject as follows: “Chromophobia manifests itself as the many and varied attempts to purge color from culture, to devalue colour, to diminish its significance, to deny its complexity…Colour is made out to be the property of some ‘foreign’ body—usually the feminine, the oriental, the primitive, the infantile, the vulgar, the queer, or the pathological” (pp.22-23).

11. Victoria Finlay describes how Mexican dyers ferment and stew the pomegranate’s rind, bark, and fruit to create a surprising broad range of colored dyes, from olive to burnt orange and gold. See Color: A Natural History of the Palette (New York: Random House, 2005), 337. Thanks go to Finlay for many of the fascinating facts mentioned in this article.

12. Ibid., 103.

13. As referenced in ibid., 274. The original source is Sadiq Beg Afsar’s seventeenth-century text Qisas-ul-Asrar in the instructions on how to make “zangan,” another name for the colorant commonly called verdigris.


15. Finlay, Color, 290–291, also describes how a mixture of lapis lazuli, resin, wax, gum, limed oil, and lye yielded the finest blues at the first pressing, with degradation in quality thereafter. She also talks with Afghans at the original Sar-e-Sang lapis mine—the source of Michelangelo’s blues—about the different grades of stone quality before preparation.

16. Ibid., 581.


18. Cennini, Il Libro dell’Arte, chap. 47, 94.

19. Finlay, Color, 240.


21. Finlay, Color, 284.


27. Finlay, Color, 110.


30. Quoted in Finlay, Color, 106.

31. Ball, Bright Earth, 94.


33. Delamare and Guineau, Colour, 72.

34. Finlay, Color, 322, and Balfour-Paul, Indigo, 223.

35. See Ball, Bright Earth, chap. 4. “Secret Recipes: Alchemy’s Artistic Legacy,” 72.
