Design by Lucie McCullough Sarah Winchester

Need to Know

Building Biology Designer Lucie McCullough Wants You to Design Healthier

These unexpected decorating decisions can impact your clients' health

By Katherine Burns Olson

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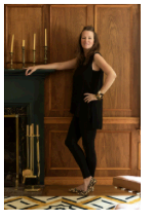
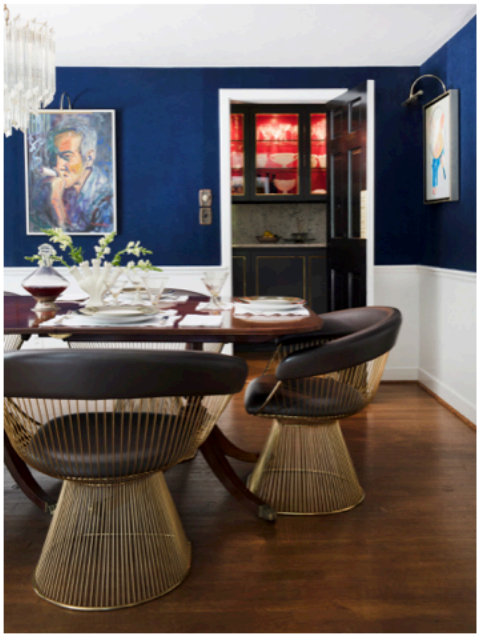
Some of the most thoughtful design decisions in Lucie McCullough's Concord, Massachusetts, home, are obvious even to the untrained eye. Consider the living-room carpet she designed, inspired by sojourns through India, and the master bath's pair of antique Chinese screens, inspired by a set designed by Sir David Tang that McCullough first spied at the members-only China Club in Beijing. But what's under the surface in the home–which McCullough, her husband, and their growing family moved into following 10 impactful years in Hong Kong–is what's most notable: The living-room carpet comprises pure silk, pure wool and botanical dyes, and was made without chemical washes or formaldehyde. The Chinese screens were stripped back and coated to prevent mold growth on their journey west. And within the build of the house itself is magnesium oxide board, an alternative to standard blue board; radiant heating for the tiled basement floor to limit humidity; and chemical-free grout throughout. Each decision in the home has been made with a desire to promote its occupants' health from the inside out, adhering to the principles of a field called Building Biology.



Lucie McCullough, certified Building Biologist and designer, in her Massachusetts home, where she implements Building Biology principles. Monica Spezia

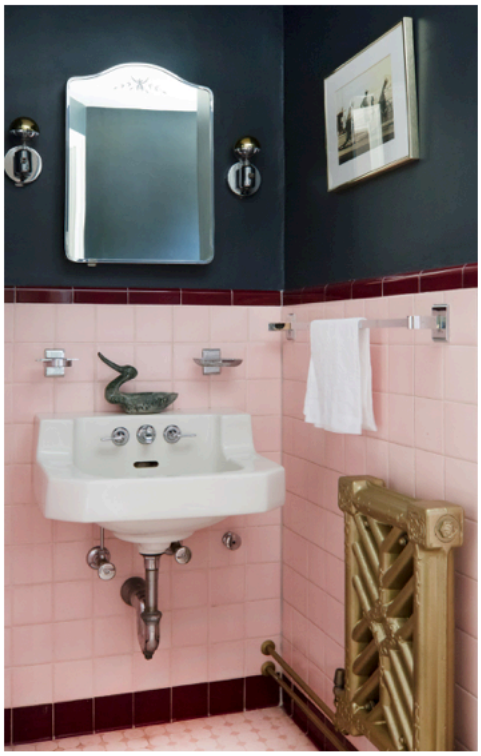
It was during the decade-long stretch in Hong Kong that McCullough's, and her adoptive daughter's, struggles with air contaminants began, as both experienced reactions to mold and other chemicals. When she and her family moved to Concord, she took pains to put their health first. "We bought the house, and I went about renovating it. I became friends with the owner of a local farm-to-table restaurant, and during a long conversation about sustainability –but not quite knowing I needed more than just that–I asked her if she knew of a 'nontoxic' insulation. She directed me to a natural home store down the road, where the owner immediately introduced me to the lady who has become my teacher of four years now. Two days later, I was on a plane to Santa Fe to attend the first of a series of courses at the Institute of Building Biology." Her education informed nearly every aspect of the family home.



The designer's home in Concord, Massachusetts, was designed in keeping with Building Biology. Sarah Winchester

The practice has been, for McCullough, a fitting way to respond to the explosive growth and change in both the building and electronics industries. "Building practices, standards, and materials have changed constantly over the years, and the proliferation of electronics in the last 10 years has been particularly rapid. While much of the progress has led to material savings in cost, time, and expense, it hasn't had the benefit of multiple generations of trial and error that older techniques and materials had. Building Biology provides another lens through which to evaluate building processes, using the criteria of a healthy, calming environment, and longevity in construction–it is estimated that the average lifespan of a house built today in North America is under 30 years."

The design decisions advocated by McCullough, and by the philosophy, can be granular, and they have significant repercussions: "[The practice] imposes extra scrutiny on elements of construction that can seem basic, but carry with them unanticipated consequences. For example, [one technique] creates a building envelope whereby the vapor can pass through the walls so that moisture, or even bulk water from any fault inside the home, doesn't create a situation where mold can grow, which in turn can lead to poor indoor air quality. The materials chosen have also been used in many traditional cultures, thanks to their known natural ability to be mold-resistant, such as magnesium oxide boards, lime plaster, and clay paint, to mention a few. Another example could be electric wiring, often done incorrectly, which doesn't prevent the electricity from working, but can create an electromagnetic field that can have far-reaching consequences on mental state and physical well-being. A focus on the important concepts of build quality, indoor air quality, and EMF, and an in-depth analysis and understanding of each of these, underpins much of the practical application of Building Biology."



One of the bathrooms in McCullough's home. Sarah Winchester

So what can the uninitiated, but interested, designer take away? As McCullough points out, "While many of the more structurally focused elements of Building Biology are complex, there are several areas which are straightforwardly addressable, and can make a substantial difference to the health of any room." She shares her tips for building—and decorating—mindfully.

On Furniture and Upholstery

"The clean furniture movement is still nascent, and while there is a growing selection of great pieces on the market now, I still find, more often than not, that I end up working with artisan carpenters and upholsterers to create individual pieces which give me the aesthetic I am looking for, and which I know are manufactured with the materials I am comfortable using," says McCullough. As for upholstery and materials, she uses natural latex foam, organic wool batting, and/or buckwheat hulls for upholstery and furnishing. She also opts for 100% cotton or linen, or 100% silk/silk velvet for covers, noting that "Cisco Brothers does a range, developed by a fellow building biologist, called Inside Green, which is very clean and environmentally conscious."

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McCullough points out, "Right now, I spend a lot of time custom-designing pieces, and the job of coordinating different artisans to produce them using the right materials is challenging. I do, however, love to design furniture, so it offers my clients something completely unique on so many different levels."

On Paint and Varnish

Consider Bioshield lime plasters and clay paints "for that earthy effect, which makes you feel like you live in a forest. For deep, rich colors, where you don't want high VOCs, which naturally increase with the addition of pigments, I would recommend ECOS paints, which can be mixed to match any color. For wood varnishes, I love the Belgian brand Rubio Monocoat as a non-off-gassing alternative to conventional wood varnishes. Osmo oil from Germany is also great and readily available worldwide."

On Air Quality

You may have aesthetic reasons for opting out of wall-to-wall carpeting, but McCullough shares some scientific ones as well. "At a minimum, reduce the level of VOCs [volatile organic compounds—carbon-based chemicals that off-gas over time in normal temperatures] by eliminating synthetic fragrance, focusing on using materials with low VOCs, and opting for naturally upholstered furniture and/or carpets," says McCullough. "Many materials used in modern manufacturing contain chemicals that do not remain inert, but gassify and enter our environment, polluting the air we breathe, and in some cases causing disruption to our bodies' function (and the development of younger bodies and brains) by disrupting hormones, entering every organ in our body, and attacking our immune systems, which makes us more vulnerable to serious diseases.

"Sick Building Syndrome is often traced back to high VOCs, formaldehyde (found in most commercial carpets) being the biggest culprit. To that end, I would advise avoiding wall-to-wall carpets at all times. They can be very toxic in themselves, and also are traps for toxic particulates in the house.

"The Green building movement seals the home and then mechanically ventilates it. We suggest avoiding vented HVAC systems; use radiant heat rather than forced hot air, and mini-split units rather than central AC. Vents, with the humidity-generating conditions created by the temperature changes taking place across the system, can be a breeding ground for mold, which then gets circulated by the air flow, along with other particulates, all around your home. Heating a thermal mass (like flooring) is also much more efficient than heating air, so radiant heating is much kinder to the planet."

On Electromagnetic Pollution

"LEDs, fluorescent lights, and dimmer switches create dirty electricity and can inhibit your melatonin production, which in turn affects sleep, our biggest regeneration tool. Stick with incandescent bulbs, and set up several lighting layers on different circuits, which can be combined to create the right light quality for different purposes. Compact fluorescent lights also contain mercury; they are not only dangerous for occupants, should one break, but also very toxic for the ground upon disposal."

On Wireless Radiation

"Another source of electromagnetic radiation, the 'Internet of Things,' is a sexy, edgy concept, which is being put to more and more use. It also typically relies heavily on a pervasive Wi-Fi network, which generates higher EMF readings as more items pull off the network. Hard-wire all electronics; this will contribute immeasurably to a healthier living environment inside the home. And, given the studies that are appearing on the effect that wireless radiation has on our ecosystem, it will also help that."

On What to Avoid

Are there materials or conventions that designers should reject outright? "In most design companies' defense, they are manufacturing products which are in compliance with applicable national or state-level standards," points out McCullough. Yet, she says, "that doesn't get around the problem that over the last three to four decades, with the introduction of a multitude of new chemicals, we don't have sufficient evidence of safety to offset some of the worrying evidence that is starting to accumulate about their potential impact on human health. That said, she does recommend avoiding the following: flame-retardant foams containing bromine, which, she says, "has proven to be highly carcinogenic," as well as formaldehyde, "a known hormone disruptor which causes problems to the central nervous system."

She recommends steering clear of "synthetic materials, which often off-gas and are generally not good for us or the planet, as they don't have the same ability to biodegrade as natural materials do," and wireless technology, including "WiFi routers, thermostats, wireless music systems, etcetera, which create high electromagnetic fields and have been proven to be carcinogenic," she shares. "Much of what is commonly used in households can easily be hardwired."