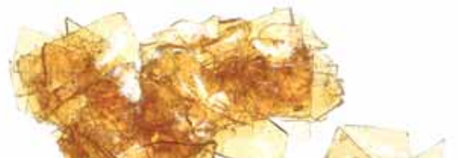
The hunter-gatherer of lost colors: Georg Kremer and his trademark, a bull painted in a brilliant shade of smalt blue.

TRADITIONAL COLOR PRODUCTION, GERMANY

Mother Nature's Most Beautiful Daughters

Natural colors unfurl in a unique display of fascinating brilliance when applied to walls and altars in old churches or used in paintings by great masters. They truly come into their own. Their ancient formula had almost sunk into oblivion when German chemist Georg Kremer from Aichstetten rediscovered the historical pigments and began to specialize in the production of the inks which are now coveted all over the world.



Renowned as color bases for centuries: indigo and seed lac.

In the summer of 2004, the world's media gathered around Dresden's restored Frauenkirche (Church of Our Lady) to watch as the famous cupola was ceremonially crowned with the cross. Fifty-nine years after its destruction, the cross, which stands 24.9 feet (7.60 meter) high and whose reconstruction remained true to that of its historical predecessor, shone resplendently once more, the sun's rays reflecting the 24 carat gold and a particularly brilliant blue. Only smalt, an ancient pigment which was discovered in 2000 B.C. and whose main component, cobalt, was formerly mined in Saxony, is capable of producing this heavenly blue luminosity. A truly special day – and not only for the regional capital of Germany's Free State of Saxony. This moment also struck a chord with chemist Dr. Georg Kremer. As the world's only manufacturer of smalt pigment, he alone is responsible for the brilliant blue of the cross, mixed with the very same smalt with which the "color man" began his career 40 years ago.

In the 1960s, a restorer and friend of Kremer embarked on a desperate search for the blue pigment which had not been produced since 1910. On hearing this, Kremer, a job-seeking chemistry student in Tübingen at the time, made some fledgling attempts to track down the pigment analytically in his mini laboratory. And, believe it or not, the reconstruction was a success. "At 2192°F (1200°C), cobalt ore, silica sand and potash melt into a blue glass nugget which is subsequently ground down into ultra-fine granules," reveals Kremer. However, the precise recipe is kept firmly under wraps, as the student's discovery simultaneously exposed a gap in the world market. Two years later, the portentous mixture would form the basis for Kremer's own enterprise.

Brews from a witch's cauldron. The chemist has succeeded in reconstructing more than 80 historical pigments in almost 40 years. Some of the ingredients seem more suited to a medieval alchemist's almanac, such as condensed cattle urine, dried lice, snail gland secretions, madder root and arsenic sulphur. "However, the majority of natural inks consist simply of dirt, of earth," comments Kremer prosaically. He doesn't believe at all in medieval mumbo-jumbo. He is merely a scientist capable of perceiving the subtlest differences between colors, as a color test attested. "Analyzing, examining and re-examining – looking closely and trying to reproduce the various nuances – is my professional passion," Kremer says.

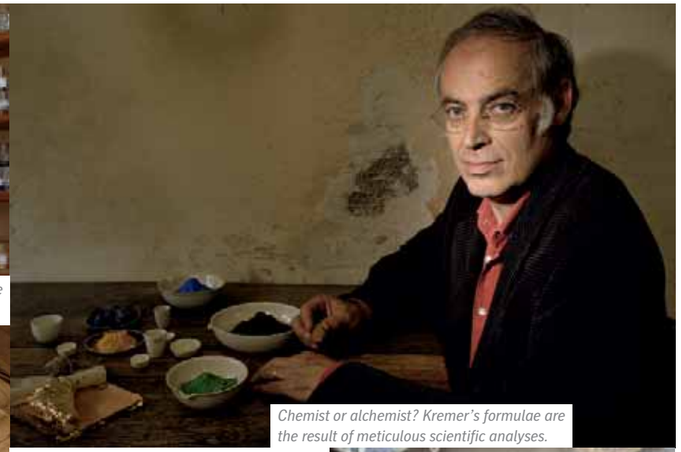
Over the years, he has converted an old flour mill in the village of Aichstetten, in the Allgäu region, into an international trading center for traditional pigments. Here, in the depths of Swabia, "Kremer Pigmente" currently employs 30 people, while 20 others work in his subsidiaries in Munich, Stuttgart and New York. Today, around 100,000 customers dabble their brushes in the colors treasured by geniuses in centuries gone by. They prefer the older formula to the modern synthetic, mass-produced industry shades. Artists and restorers, book illustrators, architects, interior decorators and violin makers alike have all developed a taste for this "natural alternative". More than half of the world's museums use Kremer pigments to restore their artistic treasures.

Baroque colors, full of joie de vivre. The 59-year-old boss makes regular pilgrimages across Europe, delivery truck and employees in tow, personally excavating over 40 secret sites in search of long-lost minerals. This often proves a laborious and protracted undertaking. For example, Kremer spent seven years searching for a particular shade of violet for the ceiling fresco in the Swiss Benedictine Abbey of Maria Einsiedel. He finally found it in the Maritime Alps in France. "This shade is simply unique and can't be imitated," he says. The more defined and crystalline a mineral is, the easier it is to find a reserve deposit. However, if the search involves a sedimentary rock type with a large number of substances, the deposit is usually unique. "Its impurity lends it extremely specific characteristics," the mineral expert explains.

The animated, baroque coloring used in the reconstruction of the Frauenkirche also required an extremely rare mineral. It goes without saying that only Kremer was able to procure the required ▸

Kremer's son and grandson in the "treasure chamber" filled with historical pigments.

Many colors are produced by hand.



Chemist or alchemist? Kremer's formulae are the result of meticulous scientific analyses.

Precious colors from the Allgäu are dispatched on journeys around the world on a daily basis.

amount of "Bohemian green earth", although the only source lay in the middle of a restricted military area in the Czech Republic where he was never allowed to set foot. Kremer refuses to divulge exactly how he obtained the mineral despite these hindrances, yet it's clear that the long search to access this raw material has resulted in a deep affection for this particular shade of green. "It's one of my favorite colors – one of many. After all, Mother Nature simply has so many beautiful daughters," he says.

The world's most precious pigments. Lined up on the shelves in the open-plan office in the Allgäu mill, these beautiful daughters of mother nature form a colorful honor guard: innumerable transparent miniature plastic pots containing pulverized pigments, some of which are more precious than gold. There's magenta, for example, former symbol of power and the color of cardinals, emperors and popes. Only small amounts are now ordered, and this very rarely. The gland excretions of 8,000 magenta snails are required to produce a single gram (0.3 ounces) of this precious substance which can be yours for 2,500 US dollars (2,000 euros). Today, this color, with its "transcendental character", is used almost exclusively for restorative purposes. Yet the most coveted pigment of all time goes a very long way – "a single gram (0.3 ounces) is enough for around 10 square feet (1 sq. m)," stresses Kremer.

On the other hand, the most expensive red, and one of the world's oldest pigments, is vermilion. "We obtain chunks of this extremely rare mineral via the Ministry of Health in a Chinese province, as vermilion contains mercury, which is considered healthful in China," comments Kremer. The succulent shade of red illuminates the renowned Isenheim altar by Matthias Grünewald in Colmar in Alsace (France) and remains in demand to this day, relatively cheap at

Leaf shellac, button lac, seed lac and madder root – the basis for valuable pigments.

"only" 2.50 US dollars (2 euros) per gram (0.3 ounces). "Those restoring Grünewald's works, wherever they are in the world, always come to us for our authentic vermilion," says Kremer proudly.

Kremer has renamed the purest, most precious blue powder on earth, lapis lazuli, "Fra-Angelico blue" after the creator of the world-famous frescos in the Monastery of San Marco in Florence. Kremer is now the world's sole manufacturer of this pigment. Some 2.2 pounds (approx. 1 kilo) of semi-precious stone from Afghanistan are required to produce a mere 7th of an ounce (20 grams) of pigment back in the Allgäu, in a month-long process involving three laboratory assistants. The precious raw material is initially broken up and ground to powder with a mortar before being sieved until ultra-fine. After this, the powder is combined with a secret mixture of oils, waxes and resins, transforming into a mash that is left to sit for a minimum of 48 hours. After this, kneading is the order of the day. Sewed into little linen sacks, the mash is worked again and again and rinsed in lukewarm water. After 14 days, the sediment can be dried and finally pressed through a hair sieve. The blue pigment is then dispatched to destinations around the world for 20 US dollars (16 euros) per gram (0.3 ounces). However, when an Italian artist once ordered over two pounds (1 kilo) of the pigment, patience was required. Kremer's men can produce no more than 3.5 ounces (100 grams) per month.

Natural colors vs. industrial colors. Even Kremer comes up against insurmountable obstacles, albeit very rarely. He is, for example, unable to deliver authentic "India Yellow" pigment. Animal rights activists outlaw its production, a ban which Kremer fully supports. To obtain it, cattle are fed only on mango leaves, with the famous yellow subsequently distilled from their urine. Nevertheless, no one has to forgo the yellow ink. After many protracted attempts, the chemist succeeded in finding an artificially produced pigment which is optically identical to the original India Yellow.

"Natural colors are far superior to synthetic industrial ones in terms of light resistance," stresses the chemist. They glow under the microscope like a starry sky composed of countless crystals. These reflect more strongly on the surface, making the color even more luminous. "Only pure, unblended material is capable of generating this brilliance and vibrancy," comments Kremer. Each pigment has its own chemical and physical properties which cannot be achieved via mixing alone. "This also applies to printing; an extremely luminous ink cannot be created using an offset technique but only with a pure pigment."

Natural inks on modern offset printing presses? Kremer's pigments cannot be used on offset presses. "Wood printing, stone printing, linoleum printing, screen printing, all types of printing which are carried out step by step – these are fine. If you want to achieve a particular level of color, our pigments are perfect. However, if your aim is to attain typical printing press characteristics, it's better to look elsewhere," explains Kremer, adding: "The absolute limit would be the Heidelberg platen press." His pigments would create a fine, sandy effect, and, in the long run, cause the type's precise edges to blur slightly, making the print look washed-out. On the other hand, Gutenberg's black pigments were made up of amorphous, non-crystalline structures with tiny particles. "If someone wanted to order that, I'm sure it could be arranged," smiles the chemist, who is, after all, a clever Swabian entrepreneur. ■

Facts & Figures

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