

SCIENCE FRICTION

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Scientific research: What's wrong with this picture?

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By Stephen Strauss [CBC News](#)

"The men of experiment are like the ant, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes the middle course: it gathers its material from the flowers of the garden and field, but transforms and digests it by a power of its own." — Sir Francis Bacon

If there is a defining feature of modern science, it is that it has become a collective, expensive, excommunicatory effort. Scientists are seen as those eccentrics in white coats who daily bury themselves in computer-cluttered laboratories or build billion-dollar machines to simulate the universe after the Big Bang.

They usually write an almost incomprehensible language - *Ising vectors in the vertex operator algebra V_{Λ^+} associated with the Leech lattice Λ* is a recent journal title favourite of mine — and seem to ignore our non-scientific piddle of a life entirely. They are Bacon's ants incarnate.



Christopher van Donkelaar's icon, Adam naming the animals, which was done using home-made pigments sourced within 100 miles of his home. (Christopher van Donkelaar) That is what in part makes Christopher van Donkelaar's recent six-month, bee-like scientific and artistic journey such a fascination.

What he decided to do was to create a painting, in the style of Greek church icons, of Adam naming the animals. The catch: He would use only pigments he could gather from within a 100-mile radius of Cambridge, Ont. — the locale where the painting would be exhibited.

He called it his 100-Mile Art Project. Van Donkelaar's efforts clearly were inspired by the now famous 100-Mile Diet, which Alisa Smith and James MacKinnon created on Vancouver Island — a conceit that has subsequently turned into a metaphor for anyone's efforts to live in greater harmony with their local version of nature.

"We participate daily with food, and I wanted art to show that too — it's responsible beauty," van Donkelaar told a local newspaper about his motivation.

Picking out pigments

He was also inspired by the fact that the southern Ontario locale in which he lives had in the past produced pigments of various sorts that gave individual town buildings a colour characteristic of local clay. So he set out to find natural materials and then transform them into the colours he needed to paint.



Christopher van Donkelaar draws the iron bloom from his bloomery in order to create one of the pigments for his painting. (Christopher van Donkelaar) This journey in quest of local colouring required van Donkelaar to assume the hat of a large number of scientific "ists." He had to become a geologist, a botanist, a physicist, a chemist, a paleontologist, an agronomist and a modern alchemist. The stories that flowed out of van Donkelaar's quest (by the way, he has a degree in history) were mythic in their improbability.

For example, it turns out that the best black pigments in the world are derived from tusk ivory due to the heavy concentration of carbon in them. This led van Donkelaar to fear that in a walrus-elephant-rhinoceros-less Ontario, any panther Adam would name would bear a coat of inferior black.

Then van Donkelaar heard Peter Russell, from the Earth and Environmental Sciences Museum at the University of Waterloo, give a lecture describing his search for sites at which mastodon remains had been unearthed in the area in the late 19th century. Van Donkelaar approached Russell and asked if a bit of spare, local, ancient elephant-like tusk could be donated. A week later, a chunk was proffered.

A success, but one that van Donkelaar feared might have been just the prelude to a larger failure.

"Firing 11,000-year-old ivory is a bit of a nerve-wracking experience," van Donkelaar wrote about his move into chemistry. "Early on in my attempts to make ivory black, I had received some wonderful walrus tusk ivory and excitedly fired it, only to find that my container had cracked and the resulting rush of oxygen had turned the tusk into ash. Since bone ash has no value as a pigment, this was very disheartening."



Christopher van Donkelaar and his children Claire and Michael plant woad. (Christopher van Donkelaar) So he tried again using an old piano key, and the process seemed to work when the key was packed with sand. Still, not all ivory might react similarly. With trepidation he put the tusk in a canister, surrounded it with sand, put it in his wood-fired furnace and ... well, given the end product of the piece, probably prayed. The black and happy result [can be seen online](#).

Another time he collected little nuggets of pyrite in the shallows of Lake Huron. He thought they would turn into nice yellowish-brown sienna, but when he melted the material, "I opened the crucible and saw the whole mass had turned black. I thought I was ruined!"

Then, guided by an instinct he still doesn't quite understand, he applied a magnet to the mass and suddenly a black mane stood out from the lump. Quite by accident he had created not the intended sienna, but a magnetic precursor of the pigment known as Mars Black.

Pursuit of scientific happiness

The painting van Donkelaar did as a result of all this work (the medium was [egg tempera](#)) was exhibited in a show at the Cambridge Centre for the Arts, which opened on Sept. 26.

I will skip over the parts of van Donkelaar's efforts in which he describes raising chickens in part to make use of the yolks in their eggs, seeding a field with a plant called woad that produces a lively blue, and smelting a rock called galena into lovely white pigment using a classic technology employed by the ancient Romans. "Basically, it consists of three ingredients being brought together: Lead medallions, vinegar and horse manure."



Christopher van Donkelaar experiments with a home-made electromagnet for separating magnetite from sand. (Christopher van

Donkelaar) I'd rather concentrate on the things I find particularly striking about his approach to research.

First, it seems a kind of scientific pursuit that is emotionally healthy. Van Donkelaar takes his small children with him on his mineral pursuits, enlists schoolchildren to help find pigment-bearing rocks, gives in to excitement and generally luxuriates in the whole of nature. (Van Donkelaar and his wife, Caroline, [wrote a small but delightful book](#) about the pigment project.)

What is unhealthy about modern science is just what Bacon saw. People who do it refuse to feel part of a whole. They reduce and narrow and dissociate themselves from nature. As University of Guelph biologist Paul Hebert recently put it to me: "We have our silos and damn it, you are not going to get us out of them."

What van Donkelaar did is that most unscientific of things: He had fun, he learned from everywhere and he taught as he learned.

And the scientists he worked with were envious of that. "They would say to me, 'I know the theory, but you are doing it,' " he told me.

Having sung the praises of a kind of science I think many scientists secretly yearn for, let me announce a contradiction. Almost no other artist is going to want to do what van Donkelaar did. It is simply too hard and too time-consuming to become a self-sufficient artistic locovore.

Shipping things in from afar is not only easier, but it expands one's palette to include the world. The science/technology/industrial complex we have invented is less whole, less fun, less invigorating than exploring nature - but it makes life much, much, much, and many more muches, easier.

"What I think is that the environmental movement's core problem is convenience. When things are easy, we don't value them," van Donkelaar says about the larger truth he has learned from his effort.

And that's the problem with 100-mile diets of various sorts. We won't realize how convenient the world has become until that convenience has vanished.