The Electron Microscope as Muse

Physics and painting appear to have nothing in common with each other. Yet artist Dirk Vander Eecken and scientist Staf Van Tendeloo have effortlessly bridged the gap between the two. Dirk Vander Eecken's doctorate is inspired by a series of black and white images given to him by Staf Van Tendeloo.

A few dozen physicists, chemists and engineers work in the internationally renowned EMAT-laboratory of the Physics department at the University of Antwerp. Aided by the electron microscope they research the structure and elements of matter. The advanced apparatus makes it possible to research material on an atomic scale. This is called nano-science, the study of structures with a surface ranging from around 1 to 100 nanometers (a nanometer is about a millionth of a meter). EMAT, which stands for Electron Microscopy for Material Research, the heart of the University's NANO-excellence center, is crucial in the development of new materials with unique qualities, materials that are stronger, lighter, more durable or more 'conducive'. Since the beginning of 2007, EMAT scientists have been receiving regular visits from Dirk Vander Eecken, a painter who also teaches 'liberal arts' at Sint Lucas Antwerpen (Karel de Grote-Hogeschool). Dirk Vander Eecken is working on a PhD in the Arts. He is creating paintings inspired by images produced on an electron microscope at EMAT: images of atoms, or more precisely, of atom accumulations. Professor Staf Van Tendeloo, director of EMAT, is Dirk Vander Eecken's sponsor.

From Polder Landscapes to Atom Accumulations

Nano-science and painting: an intriguing but not a very obvious combination. Dirk Vander Eecken: "For artists the threshold to the academic world has always been high. Until a couple of years ago I couldn't even imagine landing in a lab like EMAT to initiate a research project and a PhD. But because art (and other vocational) institutes are being taken to a university level, the situation has changed completely. Collaboration between artists and scientists is being encouraged. My PhD has given me this incredible opportunity to make contact with a new and fascinating world in which I've been able to give my art a place. Of course I'm an odd presence at EMAT. Nano scientists speak the language of physics while I express myself more freely and in images. We perceive the same things with different eyes which is just fantastic."` What does he aim to achieve with his PhD? How does it fit in his development as an artist? Dirk Vander Eecken: " Even though I've only officially been working on this PhD since the beginning of 2007, it's been a part of a process I've been working on for 4 maybe 5 years. I've been researching chaos, order and foreign elements that could be misinterpreted as deviations in a sequence. "I started making paintings of a flat, expansive landscape in Watervliet, a village located between Eeklo and Terneuzen, in the middle of the polders, where I own a house. I perceived the landscape from an imaginary air balloon so that, just like the EMAT images, it became a geometric pattern on a larger plane. I interact with that landscape as a painter."

He has created a series of maps of this landscape as it were, where he has repeatedly left his mark as a painter. He has appropriated the landscape through painterly intervention. Dirk Vander Eecken: " Emeritus professor in Physics Jef Van Landuyt, who is also chairman in the Arts Commision on the University of Antwerp Campus, has pointed out some striking resemblances between my paintings of that landscape and the black and white EMAT images...images of structural matter on an atomic scale that were produced with an electron microscope. In both cases you can see complex patterns of dots, lines, etcetera. This deduction led Professor Van Tendeloo from EMAT and myself to collaborate resulting in the PhD.

"I haven't become a scientific illustrator. I'm just continuing the path I decided to follow a few years ago. The most important difference is that my interventions as an artist are focused on 'landscapes' of atomic accumulations." Professor Van Tendeloo and his EMAT team know that even the smallest of changes in atom accumulations or the introduction of a limited amount of foreign atoms in such an accumulation are often enough to acquire an entirely different material with its own set of qualities. Particles less than a billionth of a meter that determine the earth's qualities are very inspiring to Dirk Vander Eecken.

By giving a personal touch to atoms, by arranging and reorganizing them, altering accumulations, by creating distortions, adding colors, he lays the foundation for new undiscovered worlds in his paintings which everyone can add specific characteristics to with their own imagination. The artist an illusionist, a God in the deepest of his thoughts.

Conscious Mistakes

Matter always reveals a certain amount of defects. Here and there the perfect sequence of atoms is disrupted. Errors in carbon atoms in diamonds decrease the clarity and brilliance of the stone. Dirk Vander Eecken, remarkably, adds errors to his work. These are artistic rather than natural defects.

Dirk Vander Eecken: "By rubbing or another physical action I want to avoid that it all becomes too pretty, too symmetrical. An image is never perfect to me. But whereas I used to dare provide my paintings with charming defects, pour le plaisir les yeux, I now choose defects that are more irritating, more annoying. That seems to be an obvious difference." By applying these defects, there is room for chance.

Dirk Vander Eecken: "Everyone is familiar with Andy Warhol's 60's screen prints, where he made 3 different series of prints in color in editions of 10 of a portrait of Jacqueline Kennedy. Each print is different and a unique work because the nature of printing. In some places the paint has bled out or there is more or less contrast. In a similar way I create situations wherein deviations and errors are brought forth which I don't have complete control over. Chance plays a role in my work. Of course I can still decide whether I want to keep a mistake or not. Some mistakes are more interesting than

others." The introduction of mistakes is in direct correlation with the tension between order and chaos, construction and deconstruction of which the reality is steeped with on a nano as well as a macro scale. This tension has intrigued Dirk Vander Eecken for years. Inaccuracies deregulate the sequence and can even be perceived as rebellious if not subversive elements in an otherwise flawless but also sterile and suffocating predictable system. They are equally symbols of freedom and revolt as well as symbols of dislocation and decline.

Poet-performer Jules Deelder while pointing to his chipped front tooth: "Somewhere, decay has to be visible." Dirk Vander Eecken: "I introduce an element of drama in my work with these inaccuracies"

In September Dirk Vander Eecken is presenting his doctorate at the Royal Museum for Fine Arts in Antwerp. An intervention at EMAT (Groenenborgercampus, bldg X) and an exhibition of his work at Galerie van der Mieden (Pourbursstraat 15, Antwerp) will be taking place at the same time.

Dirk Vander Eecken: "I'd like to hang the EMAT-images between my untitled paintings without the viewer being able to tell the difference between art and science. The difference between the two kinds of images should disappear and a unity should be created by taking the nanostructure images of their academic context and by showing them in an artistic context. The ultimate synthesis of art and science. My PhD will coincide with the publication of a 200 page book of a combination of the EMAT images and my images"

What do you mean abstract?

Will the viewer need to know something about nano science and the creative intentions of the artist to understand and appreciate the images? Dirk Vander Eecken: "I don't think so. I'd actually prefer if people could look at my work from an unprejudiced and personal perspective. I've sounded out visitors in my studio on various occasions and it always surprises me how they understand the paintings." Despite their abstract nature? Dirk Vander Eecken: "What does 'abstract' mean? When we're unable define something, we label it as abstract. The EMAT images appear abstract for those who can't situate them, but for nano-scientists they merely reflect reality on an atomic scale. It's only natural that you can't discern grass and can only see the furrows and the rectangular fields when I paint landscapes as seen from an air balloon. There are certain things you can and can't see on different levels. A part of reality always escapes. You can just as easily say that my paintings are figurative. Because atoms are not visible to the human eye, the EMAT images are only an interpretation of reality. Frequencies of light are too great to be seen. In electron microscopy the interactions between electrons on the microscope and atoms are translated into images. As an artist I can effortlessly make the atoms visible, hence the title of my doctorate: *The art of the invisible*.

Art and Science/ Many Similarities

Can we deduce from Dirk Vander Eecken's doctorate that the gap between art and science isn't as large as is believed? Staf: "Scientists and artists have a lot in common. They share the same to determination to break boundaries. They observe the world, pose themselves questions and are constantly looking for something new and original.

The path to knowledge is, like the creative process, incalculable and unpredictable.

Picasso never woke up saying: 'Today I'm going to invent cubism'. And Einstein's relativity theory didn't just drop out of the sky. You have to experiment, constantly consider and explore new possibilities, until your thoughts and experiments take on a more solid shape and you feel like you're on the right track.

Creativity, inspiration and intuition are essential both in art as in science. That science lacks imagination is complete nonsense. Without imagination there wouldn't be chord theory or quantum mechanics and we would never have realized that our lives are greatly determined by the sequence of atoms.

Dirk Vander Eecken: "A lot more research is being done by taking many art courses to a more academic level, but in fact artists have always done research. Not in the same exact way as scientists, but still. It's a terminology issue. What is meant by research in the arts? When you want to create a painting or an image you need to research what you want to create and in which manner, all the while considering what other artists have done before you. How could I make an interesting painting today without knowing the work of say Mondriaan? It doesn't make sense to reinvent the wheel.

Staf Van Tendeloo: "As a consequence of specialization it's become impossible to become both a great artist as well as a great scientist like Leonardo da Vinci. Yet some prominent scientists have recently shown a kinship with art. The chemist Ilya Prigogine, one of the few Belgians who won a Nobel prize, was a wonderful pianist. And Einstein enjoyed and was quite adept at playing the violin. You also have your share of artists with a keen interest in science, like M.C. Escher, Panamarenko or Gerhard Richter. The latter was actually also inspired by electron microscope created images in a few of his works."

Defining versus Interpreting

Professor Van Tendeloo published *The Beauty and the Beast* (Acco, 128 pages, 2006) in which several similarities between science and art are pointed out. It consists of a series of essays on subjects such as "Science in art", "Art in science", "Inspiration", "Mathematics or erase-atics", "The wonderful world of carbon" and "Painting with nanotechnology"

Reading reveals all sorts of thoughts and discoveries. On the Golden Rule: " Da Vinci tried pointing out that our aesthetic perception, our aesthetic norm isn't actually personal but can be mathematically explained." On computer art: " The computer

offers, thanks to scientific developments, infinite possibilities to the artist who is able to distance himself from the painting studio. The artist no longer works on canvas, but in an undefined virtual space, with plenty of visual tools and possibilities". The differences between science and art are also covered In *The Beauty and the Beast*.

Staf Van Tendeloo: " Scientists start by making an observation and then look for a rational explanation for that observation. They try to explain the world. Artists interpret the world, create their own world which they express in their art. "Scientists have a more humble and withdrawn attitude toward reality. They try to figure it out, so they can apply their conclusions for some spectacular applications. They see a bird, resolve the mechanics of flying and build a plane.

"Artists tend to appropriate the world, they submit it to their imagination to recreate it in their art. They look at a bird, dream of flying and create an image of Icarus, the young man with wax wings. They're free to go about reality as they wish. A scientist concludes that the world is round and accepts that fact, while the artist might transform this round world into a cube. This was Dirk's challenge in his doctorate: he looked at and studied the EMAT images of atom accumulations with the intention of interpreting them in a sovereign way, and appropriating these images and creating something new and fascinating out of them."

Dirk Vander Eecken: "I can relate to something cubist Georges Braque once said: science reassures us, art disconcerts us."