Book Review

Artists Turning to Science

Tami I. Spector (ed.): *Arts and Atoms*, Cambridge MA: Leonardo and MIT Press, 2013, e-book.

by Pierre Laszlo

This book assembles two dozen articles, originally published in *Leonardo* and selected by Professor Tami I. Spector. *Leonardo* is a journal founded in 1968 by Frank Malina, a rocket scientist, a director for the sciences at UNESCO in Paris, who later directed the Jet Propulsion Laboratory at Pasadena and had kinetic art as a hobby. He meant *Leonardo* as a channel of communication between artists who used science and technologies in their work. He set up peer review as a safeguard for the caliber of *Leonardo* publications, as in scientific journals.

Professor Spector is a fellow physical organic chemist, with her initial training as a Ph.D. from Dartmouth. Now a professor at the University of California in San Francisco, Tami Spector has broadened her interests to include the area of aesthetics and chemistry, writing on such topics as the aesthetics of molecular forms, or the relationships between chemistry and contemporary visual art.

The book title was clearly dictated by the alliteration, atoms and arts. It is misleading with respect to the imaging of atoms, since none of its chapters refers at all to the pioneering work of the physicist Albert N. Crewe, a professor at the University of Chicago who in 1970 startled the academic community with the first report of such pictures: A.V. Crewe, J. Wall & J. Langmore (1970): 'Visibility of single atoms', *Science*, **168** (3937): 1338-40. This is a blemish.

Gaston Bachelard teasingly wrote somewhere that a taste for miniatures is symptomatic of alcoholism. Without going so far, I was reminded by the half-a-dozen chapters on topics such as singing or sculptured proteins, and soloist bones, of journalists in my youth waxing lyrical about someone having inscribed – take your pick – the Ten Commandments, the Declaration of Independence, or the Gettysburg Address, on … a grain of rice.

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Somehow, the grain of rice, in the public imagination of the 1940s and 1950s, was the equivalent of today's nanotechnologies. I do not write this in jest. The comparison needs being developed. Since the media provide the public with what it wants to hear, the individual grain of rice was, in those distant times, a frontier of last resort: between starvation, as the era of famines was drawing to a close; and the new era, the time of food aplenty – up to and including the current obesity epidemic.

Nowadays, the silicon monocrystal and carbon nanotubes have displaced the grain of rice in the popular imagination. That scientists and their corporate bosses now inscribe their logos, not on a grain of rice but on a crystal surface, with atomic force microscopy to move atoms around, is likewise emblematic. The inventions of the transistor and of the silicon wafer have created not only Silicon Valley, but also the equivalent of what the Alps meant to the imagination of the Romantics. Crystal faces are the latest Matterhorn, Grandes Jorasses, Dolomites, or El Capitan: small brothers of the Hollywood sign are now engraved *in silico*.

In the meanwhile, of course, in-between the grain of rice of my childhood and IBM spelled with atoms, Richard P. Feynman issued his landmark challenge, inscribing the entire Encyclopaedia Brittanica on the head of a pin.

Who are the authors of the various chapters? Two historians of science, a probable art historian, and a political scientist. All the others are either scientists, numbering 18, or artists, numbering 16, seemingly a nice balance.

However, only five chapters were written in collaboration by an artist and a scientist, thus fulfilling one of the avowed goals of *Leonardo*. Scientists are trained to collaborate whereas artists are in the habit of going alone, it is thus no surprise if two chapters are written by three scientists as a team, whereas eight chapters are written by a single artist.

The book provides a sampling from *Leonardo*, covering the entire 1969-2012 period, which enables the observer to gauge the value of this journal. This sampling is biased towards the more recent, with seven contributions dating from 2011 and 2012.

The book has four parts, dealing with atomic and molecular representations; chemical concepts, analogy, and metaphor; chemical materiality and art; and, finally, nanoscience. To initiate the first part, short musical phrases are applied to electronic music for biomolecules. The second chapter covers digital design of molecular sculptures. The third is on sonification – not sonication – of proteins. Follows a chapter on protein sculptures. This first part ends with Kenneth Snelson's 'An Artist's Atom'.

The second part, on material most familiar to the readership of *Hyle*, nevertheless starts with a proposal to communicate science through the language of dance. The next two chapters are by the Hargittai teams (husband and wife, father and son) on use of artistic analogies in science research and

education. The pivotal chapter in that section, by Suzanne Anker, addresses gene culture as a molecular metaphor in art. Follows a chapter by another artist, Gertrude Myrrh Regan, on the concept of levels in matter. Then, a trio headed by Benno Hess describes dissipation patterning far from chemical equilibrium. And this second part closes with a contribution by Mark A. Cheetham on the crystal face in contemporary art.

Part III deals with physico-chemical tools of artists. Franziska Schenk and Andrew Parker on iridescent colors are extremely interesting. Chris Foster's 'Coomassie Brilliant Blue, Sudan I And Somalia Yellow' is a first-person account of the introduction of these industrial paints into the palette, for their novelty and with awareness of the health risks. Omri M. Behr and Marion R. Behr write about anodic electrolysis for tone creation and etching on metal. This 'how to' piece may be of some interest to a few fellow-artists. Likewise, Jacques Schnier writing about the carving of acrylic resin, with for him disappointing results. Had he collaborated with a scientist, he might have been able to better achieve his goals; he was seeking a combination of transparency and brilliance, as afforded by multiple reflections. Rein Leimberg's 1969 text on liquid crystals as a, at the time, new medium for artists is both didactic and dated.

I found utterly fascinating Pierre Cordier's presentation of his chemigram photographs, *chimigrammes* in French, illustrated with most handsome examples, aesthetically very pleasing. This artist has lived a vividly interesting career.

A priori, the fourth part of the book ought to carry material most appealing to the readership of *Hyle*. Gimsewski's 'Nanotechnology: the endgame of materialism' is a compilation of all-too-familiar notions.

Tarr and Weiss's 'Very small horses: visualizing motion at the nanoscale' provides a lucid and useful caveat: nanoscale images have little to do with the reality underlying what they seemingly depict. They are emanations much more than representations. If the public, bombarded with images of all types, is sold the superiority of scientific images as somehow more legitimate, their arbitrariness, conventionality, and fake colors lump them into similar discredit as the rest of the lot.

The point these authors raise about reality and appearance is welcome. It is bolstered by eloquent high-quality illustrations, carefully thought out and designed. They are very didactic, explaining for instance how to exploit their phantom views to measure motion of molecules on a surface, down to the millisecond or even microsecond scale. Is it art? Maybe not in the conventional sense. But it is artistry of the highest level, in the craft of scientific methodology. In short, a beautifully documented and fine chapter.

Robinson's 'The Role of Images and Art in Nanotechnology' mentions a few nanoartists by name. It is a honest confession from someone groping for

an understanding and clinging to conventional wisdom, including the indefensible opposition between scientists and artists, creativity being deemed the attribute of the latter only.

Ridder-Vignone and her Ph.D. supervisor, Michael Lynch, in 'Images and imagination: an exploration of nanotechnology', offer a typology of nano-art. It ranges from empirical renderings to fantastic voyages, through, in succession, nanocraft, *i.e.*, displays of virtuosity, self-assembled 'found' objects and landscapes, idealized images and models. These categories are as conventional as the images they enclose and, in so doing, obliterate into oblivion.

Toumey and Cobb's 'Nano in sight: epistemology, aesthetics, comparisons and public perceptions of images of nanoscale objects' examines nanoimages – images of nano-objects – critically. After a reminder of the difference between schematizing and figuring, comparison of nanoimages to other scientific images is urged. Some epistemological issues are drawn.

Chapple and Wong's 'Can you hear the femur play?' is a bit of an aberration. In my opinion this piece of technology – making audio speakers out of cow bone – had no place in this book.

Now that enough time has elapsed for an objective appraisal of the 'nano' field and of the attendant images, accruing predominantly from atomic force microscopy (AFM) and scanning tunneling microscopy (STM), in my considered judgment, this immense effort – in terms of its awesome funding and of the sheer number of people involved – has proven itself to be something of a fluke: a major advertising success, with hype galore, but aesthetically and scientifically a molehill or, to use another metaphor, a minor blip on the historical screen.

In conclusion, this grab-bag of a book presents texts, most of which have not aged gracefully, for being pretentious. Uniform mediocrity, with a few islands of excellence.

As for *Leonardo*, this journal has cornered itself into a most unproductive niche. Scientists, caught up in their rat race, turn their back at any involvement, however desirable, in that kind of endeavor. As for artists, they do not measure up, perhaps because they lack the technical languages for understanding scientific material.

All in all, a dead end.

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