

Comment

Galileo's stepchildren

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Inside the church of Santa Croce in Florence, just to the left of the main aisle as you enter, is the tomb of Galileo Galilei. Condemned by the Catholic Church as a heretic and forced to recant his scientific conclusion that the earth moved around the sun, he was excommunicated in 1633. With typical swiftness, the Church reinstated him in 1992, which I'm sure eased his mind considerably. Florentines still bring fresh flowers to his tomb.

Exactly opposite Galileo's tomb, on the right side of the aisle, is the tomb of Michelangelo Buonarroti, architect, painter and sculptor. His bust, which adorns the top of his sarcophagus in the fashion of the time, stares out across the aisle directly at the bust of Galileo. Michelangelo died in 1564, the year Galileo was born, so these giants of the Italian Renaissance, who helped drag mankind, kicking and screaming, out of the Dark Ages, never met. Yet they now lie only a few meters apart. One is tempted to introduce them: Michelangelo, meet Galileo; Galileo, this is Michelangelo.

Seeing the great scientist and great artist entombed facing one another, one cannot help but reflect that, throughout history, every enlightened society has held the view that science and the arts are not intrinsically incompatible. Which raises the question: what does that make us? If ever there was a society that seemed hell-bent on retreating from the idea of science and the arts as integral parts of the intellectual life of every well-brought-up person, it's ours. By 'ours' here I mean Western society in general and North American society in particular. In many universities it is possible to obtain a bachelor's degree from the College of Arts and Sciences without ever having taken a course in either the arts or the sciences. It is widely believed that the 'hard' sciences are incomprehensible to the average person and that, even if they could be comprehended, there is no need to do so. Another common belief is that knowledge of the arts is 'impractical' and therefore a waste of time compared with studies of business (a subject that, as we have seen, really needs to have a major in ethics as a prerequisite but obviously

doesn't), law (clearly important because of the serious shortage of lawyers, especially in the US), and other professional qualifiers. And the idea that science and the arts should in any way be related is seldom considered.

It was C.P. Snow - whose mediocre ability as a writer was exceeded only by his less than mediocre ability as a sociologist - who introduced the notion of 'the two cultures', by which he meant science and everything else. His ideas were quite influential and did a lot of harm. They made it respectable to shun science on the one hand or focus on it almost exclusively on the other, and the intellectual climate they helped create is with us still. It has a lot of insidious, subtle consequences. One of them is that practicing scientists who try to communicate the excitement of their subject to the general public are often regarded with the sort of esteem usually reserved for political traitors and used-car salesman. Another is that professional intellectuals who know nothing about science can make pronouncements about science being 'just another belief system' like, say, Confucianism or vegetarianism or a belief in the magical power of crystals, without being recognized by the rest of the non-scientific community of professional intellectuals as the idiots they are. One can go further and speculate that at least some of our current preoccupation with, among other things, the oxymoron of alternative medicine; ideas that run counter to the theory of evolution; increasing belief in the existence - and power - of the spirit world; and the superiority of trusting 'feelings' over thinking (which, along with a distrust of technology in general, forms the philosophical underpinning of nearly every recent Michael Crichton novel or Steven Spielberg movie, and you know how popular those are) would not have become so widespread without at least some serious debate had the disconnect between science and the humanities not become respectable.

Ironically, I think that science and the arts have a lot more in common than almost any other pair of disciplines, not so much in subject matter (although it is gratifying to see so many contemporary artists taking inspiration from the stag-

gering beauty and variety of forms in the natural world as revealed by science) as in flavor. Science and art are both subjects that are best practiced by people who see them as vocations rather than careers. In both cases one is trying to reveal truth, and often also attempting to uncover or create something beautiful ("That's beautiful!" is often the highest compliment one scientist can pay to another's work). Devotion to the purity of one's vision is ultimately valued in both fields above following fashion. Science is for most scientists a form of self-expression, just as art is, which probably accounts for the love that most scientists express for their work, except at grant-renewal time.

Which brings me to my summer reading recommendation: "A Short History of Nearly Everything" by Bill Bryson. Bryson, a superb travel writer and social commentator who combines humor with pointed observation, decided that he knew nothing about science - couldn't tell a proton from a protein, in his words - but that it was important and could be fascinating, so he set out to immerse himself in subjects ranging from physics to genetics over a period of three years. The result is an extraordinary book, one that tells the story of our universe, planet and species with wit and clarity. Never missing an opportunity for an amusing - and engrossing - anecdote, Bryson also gets the science right and tells it in a way that anyone, even practicing scientists, will find enlightening as well as enjoyable. If he - an avowed sciencephobic beforehand - can find in what we do great stories that are fun to read about, I see no reason why we can't convey that same mixture of information and excitement to non-scientists.

I am convinced that courses in one or more of the 'hard' sciences, but especially chemistry and biology, should be

required of all university students regardless of their major field. And I'm equally convinced that courses in subjects like art history and literature should be required of all science and engineering majors. It's gratifying to know that the leading lights of the Renaissance would agree with me: Michelangelo immersed himself in engineering and anatomy; Galileo was both a practitioner and a patron of the arts. Speaking of patrons, enlightened rulers such as Lorenzo the Magnificent supported - and were aficionados of - both scientists and artists. So was John F. Kennedy, but this is probably too much to expect of George W. Bush. You will note that I haven't mentioned Leonardo da Vinci here, and I won't, because a true polymath like him, who puts the rest of us to shame in essentially every subject imaginable, comes along only once every several hundred years, thank goodness. Michelangelo and Galileo are usually the Renaissance men we have in mind when we aspire to be called one. Our educational system and popular culture conspire to make that seem unattainable. As scientists we need to reach out to the public to make the things we do not only understandable but enjoyable. One way to do that is to acknowledge, and celebrate, the arts-like nature of our profession. Nowhere is this more important than in genomics, which is increasingly seen by the lay public as threatening to create a brave new world of genetically engineered food, animals, microbes and people.

Galileo is a hero - a sort of spiritual father - to many scientists because he dared stand up to the anti-science culture of his day. Standing in the church of Santa Croce in Florence, one is tempted to feel a similar kinship to Michelangelo as well. Presumptuous, of course, but somehow I think they wouldn't mind.

