

Letter

The other books – A journey through science books

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On March 2007 JCOM issue, Bruce Lewenstein made this question: why should we care about science books? Next he analyzed some fundamental roles of science books. As a continuation for that enquiry, this text wants to be a dialogue about science, readers, and books, just a quick look at many of the other books, science books, those that do not find easily their place in bookstores and libraries; these books situated beyond labels like fiction or romance but equally memorable, necessities and desirables.

The history of Communication of Science is –and *it has been*– extremely linked to the history of book and reading. By definition, science is a public knowledge: a product of diverse dialogues among scientific communities. We have to pay attention to the word *community*, which here means *procedures, methodologies and results* from scientific researches, which need to be *communicated*: public and private research institutes send its scientists to show their works at congresses around the world; they share laboratories and equipment with other members from the scientific community or they compete to be the very first one in publishing new knowledge, not just because that *natural impulse* to talk with someone else about our discovery but also because *to publish* in science is a synonymous for *surviving*. Inside the scientific community, to have a publication represents *visibility*, which could translate it in more chances to get budget for research. An example: *Science* magazine publishes almost 800 papers per year, but it receives around 12 thousand papers in that same period. It seems that *what is not narrated doesn't exist*. French writer Stéphane Mallarmé knew it more than a century ago, when he said: *au monde, tout existe pour aboutir à un livre*. (Everything in the world exists in order to end up in a book).

When scientific communities recognize the results of their researches, these results are rejected or accepted and eventually incorporated to that building that we call science. This way, science is what the scientific communities *admit as science*. One of the most efficient ways to communicate science has been by means of wrote words: notes, books, gazettes, bulletins and leaflet have been consulted by scientists from all times. To read science is the opportunity to contact with frames of thought of fascinating figures like: Archimedes, Euclid, Apollonius, Al-Khwarizmi, Copernicus, Galileo, Paracelsus, Newton, Pasteur, Mendel, Darwin, Curie, Bohr, Einstein and Gödel, just to mention a reduced sample.

These days, to read science is related to three different spheres: a) text books, that we read *involuntarily* during our scholar time; they give us the essential elements to have a main idea of what science is; b) papers in specialized journals, which shows us all the *new knowledge*; c) popular communication of science in magazines, books and Web sites, all that strategies to build a bridge from science (laboratories, scientists, universities...) and the rest of the society, pursuing didactical and recreational objectives.

Here we will talk about those books whose anecdote, *leit motiv* or content is closely related to science and technology, and they are intended to *everybody*, no matter passions, phobias or background. We'll do that because we believe those books –just as every *good* book– represent a valuable possibility in order to have a notorious influence in citizen's education in a wide range of sense of *culture*, where science is another ingredient.

Science belongs to those who make it available to *everybody*

To say that global distribution of knowledge is as unequal as distribution of richness is an obviousness: paying attention to economical indicators from *healthy* countries like: Germany, Japan, United States of America, England, Canada or Finland, for example, we can find that an important task of their Gross Domestic Product (GDP) is invested not only in science and technology research but also in articulating varied strategies in science communication: the creation of science centres and museums, the publication

of science magazines and books, the production of TV and radio shows concerning to scientific knowledge, etcetera. Similar situations could be found in *emerging economies* like: India, Brazil, Poland, or Singapore.

In all that countries, science is recently becoming an issue of *general interest*. Nevertheless, there is a mirage –a risk- always present: to confuse *information* with *knowledge*. As Spanish philosopher Julián Marías used to say: *I believe man is turning into a primitive being with a lot of information*. It is not hard to note an excess of information in our societies, which is not properly *communicated*: In 2005, British Association for the Advancement of Science pointed out that half of the British society feels *not considered* when public politics on science and technology are designed; 59% declare to be *not enough* informed on science and its development; 81% think citizens *should be consulted* when decisions about investment on science are taken; 79% are sure that scientist should dedicate more time on discussing their work's implications *with the public*. In 2004, The United States of America Science & Engineering Indicators in 2004 showed that 60% of Americans believes on extra sensorial perception; 41% sees astrology as a scientific matter and 47% do not response *true* to the next phrase: "Human beings are the product of the evolution of primitive species of animals". On November 2004, the site www.cbsnews.com showed that 65% of *English-based Internet users* agree with the idea that people at school should "learn Creationism and Evolutionism at the same time"; 37% preferred that students "learn Creationism instead of Evolution".

In Latin America, where 4 of each 10 students in high school quit studies, Communication of Science (science books and magazines, outreach activities, centres and science museums...) could be the only chance they have to know and learn *something* about science. In the presence of today's crisis at schools around the world, the communication of science could be a smart strategy to complete those educational processes started –and interrupted- at school.

Even more, it could be a way to fight against those *mediocre teachers, whose bitterness, roughness and melancholy are one of the biggest crimes in our society*, in George Steiner's words, a way to collaborate in the construction of a collective conscience about knowledge's value; not just in order to increase the number of matriculated in science and technology studies, but also as a reinforcement for a democratic contemporary society.

To a brief curriculum for science books

Every citizen, no matter where he lives, has the right to have any book, no matter where it is. That was the slogan of the Pedagogical Missions, motivated by The Second Spanish Republic at the 30's decade in the past XX century. Even today accessibility to books is an unfinished war: we can see financial obstacles (books are *expensive*); management obstacles (not all books arrive to everywhere) and affective obstacles (some books seems to be invisibles or inexistent to a big part of the society).

Mexican writer Juan José Arreola used to repeat that *language shapes our spirit, at the same time it shapes our language. Our way to speak is the way we are. Our spirit can be enlarged only in terms of language*. Then, science books expand our field of knowledge because they enrich our language, especially when reading science books is not a route to find responses, but questions.

If *general readers* are not *a lot* in the world, it seems that science book's readers are even *less* and science books are *just a few*. Uruguayan writer Juan Carlos Onetti, who has gained a reputation as *lazy*, because he used to read, to write and to eat without get off his own bed, said once: *Dostoyevsky wrote twenty romances. We don't have any notice from the twenty-first, which wasn't anything but a project, a group of notes and a series of reflections. But do we miss that twenty-first novel? Do we note its absence? What it matters!? The sun continues to get up from East...* Then, could we say: *there are so many books of science? Are they not so many? Are they sufficient?* The real question is how to educate authentic and permanent readers, because science books are a long term challenge and they have an accumulative power. Jorge Wagensberg, an experimented science books editor, besides an extraordinary writer, pointed out that *romances go up suddenly in bookstore's ranking, but they falls down and disappears with the same rapidity; Science books go up slowly in bookstore's ranking, but they remain in that level for a month after a month, during several years*.

To have a minimum –and obviously uncompleted- idea about science book's history, we need to remember some essential works: those thirteen volumes whose configure the colossal *Elements* wrote by Euclid 300 years before our era. *Elements* share the honour with *The Bible* of being the most frequently printed books. It contains axioms, postulates, definitions and proposals that represent the foundation of

mathematical thought; in the 1st century, Muslim mathematician, geographer and astronomer al-Jwārizmī, proposed important notions like *algebra* and *algorithm*; in the Middle Ages Egyptian mathematician and astronomer Ibn al-Haytham developed a truly huge work on Optics, enouncing for the very first time one version of the *Law of Refraction of Light*.

Since the invention of Printing Press -and its *immediately* success through XIV and XVI centuries- the production of science books were clearly increased: in 1543 *De Revolutionibus Orbium Coelestium* by Copernicus and *De Humani Corporis Fabrica* by Vesalius. Johannes Kepler presented his first laws of planetary movement in *Astronomia Nova*, in 1609. Latin was the main language for science, but Galileo Galilei chooses Vulgar Latin in 1632 to publish *Dialogue Concerning to Two Chief World Systems*, where he defended his own Copernican vision of Universe by means of a dialogue among three characters: *Salviati*, *Simplicio* and *Sagredo*; in 1632 René Descartes wrote *The Geometry*, included in his *Discourse of the Method*, where he proved what we know now as “Cartesian coordinates”.

In 1686, Bernard le Bovier de Fontanelle published *Entretiens sur la pluralité du monds* (“A plurality of worlds”). Considered for many people as *the first popular science book ever*, it was an absolute *best seller*. Fontanelle’s goal was: *to find an explicative language which satisfy both; the wise, learned world and the common people world*. Just a year after, one of the most influential science books ever was printed out: *Philosophiae Naturalis Principia Matematica* by Isaac Newton, a basis for the majority of physics concepts until the beginning of XX century. In 1735 Carl Linnaeus published *Sistema Naturae*, where he exposed his method to classify both plants and animals, a method widely used by scientists around the world even today. French writer and philosopher Denis Diderot joined mathematician Jean Le Rond with the idea to make real their greatest project: *L’Encyclopédie, ou Dictionnaire raisonné des sciences, des arts et des metiers, par une société de gens de lettres*, the very first encyclopaedia, a symbol for the French Illustration, created as a “synopsis of scientific, artistic and technical knowledge”.

Between 1768 and 1772, German mathematician Leonhard Euler –perhaps the most prolific mathematician ever- published *Letters to a German Princess*: three volumes wrote by Euler pursuing the aim *to instruct* the niece of Tsar Frederick the Great. That’s why *Letters to a German Princess* is an astonishing synthesis of all knowledge at Euler’s time, wrote in a simple and clear way, for *common readers*. Since 1830 to 1833, British geologist published *Principles of Geology*, which was an inspiration to a famous author of travel chronicles, who in 1859 published one of the most popular books ever. Its title is *On the Origin of Species*, by Charles Darwin; in 1860 British physicist Michel Faraday wrote his amazing book: *The Chemical History of a Candle*. Twenty years later, French astronomer Camille Flammarion sold 1.200 copies of his *Astronomie populaire*. More than 1.500 copies were sold the same day of its apparition in the market. Before XIX Century was finished, Sigmund Freud presented *The Interpretation of Dreams*.

The XX century could be called as: “the Era of Scientific Paper”; from 1869 until our days *Nature Magazine* has been printed each month: it is an authentic conglomerate of scientific publications. Its competitor, *Science Magazine*, begins its life in 1880 thanks to Thomas Alva Edison’s support and Alexander Graham Bell’s effort. Since 1900 it is the official publication of the American Association for the Advance of Science; in 1905, a young employee in the Bern Patent Office called Albert Einstein published in the German science magazine *Annalen der Physik*, three papers which change the whole history of science.

It is impossible to condense the enormous production of science books edited on XX century by Poincaré, Rutherford, Schrödinger, Planck, Bohr, Heisenberg, Born, Dirac, Curie, Watson, Morgan, Crick or Krotto, to mention just a few. It is important to pay attention to the fact that in the middle of this century a relevant transition was verified: pure scientists reduced their direct communication with *general public* by the means of books while a new character got notoriety: science communicator, often emerged from scientific communities. That way, XX century is the place of birth of classical authors of science books wrote *for everybody*. Writers who, as Spanish philosopher Fernando Savater says, *they try to understand those who don’t understand*, such as: Carl Sagan, Stephen Jay Gould, Richard Dawkins, Brian Green, Stephen Hawking, Roger Penrose, Ian Stewart, John Allen Paulos, Dan Barrows, Paul Davies, Martin Gardner, Leon Lederman...

The best science book ever

In order to make some controversy as well as pursuing a curiosity impulse, English writer Jon Turney proposed on 2006 a peculiar contest, which was carried out thanks to Imperial College and Royal

Institution's support: an event to select *The Best Science Book Ever*. The books elected on final stage were: *Il sistema periodico (The Periodic System)* by Italian writer (and former chemical scientist) Primo Levi; *King Salomon's Ring* by ethology's founder, Konrad Lorenz; *Arcadia* by English writer Tom Stoppard and *Selfish Gen* by biologist Richard Dawkins. Several discusses after, on October 19th, the unexpected winner was announced: *Il sistema periodico* by Primo Levi, the same man who after surviving Auschwitz, used to say: *those who forget their past are doomed to live it again...*

On December 2006 *Discover Magazine* did some echo of Turney's initiative and presented its own "The 25 Best Science Books Ever", as they are showed next:

	TITLE	YEAR OF PUBLICATION	AUTHOR
1	<i>The Voyage of the Beagle</i>	1845	Charles Darwin
2	<i>The Origin of Species</i>	1859	Charles Darwin
3	<i>Philosophiae Naturalis Principia Mathematica</i>	1687	Isaac Newton
4	<i>Dialogue Concerning the Two Chief World Systems</i>	1632	Galileo Galilei
5	<i>De Revolutionibus Orbium Coelestium (On the Revolutions of Heavenly Spheres)</i>	1543	Nicolás Copérnico
6	<i>Physica</i>	circa 330 a. C.	Aristóteles
7	<i>De Humani Corporis Fabrica (On the Fabric of the Human Body)</i>	1543	Andreas Versalius
8	<i>Relativity: The Special and General Theory</i>	1916	Albert Einstein
9	<i>The Selfish Gene</i>	1976	Richard Dawkins
10	<i>One Two Three . . . Infinity</i>	1947	George Gamow
11	<i>The Double Helix</i>	1968	James Watson
12	<i>What Is Life?</i>	1944	Erwin Schrödinger
13	<i>The Cosmic Connection</i>	1973	Carl Sagan
14	<i>The Insect Societies</i>	1971	Edward O. Wilson
15	<i>The First Three Minutes</i>	1977	Stephen Weinberg
16	<i>Silent Spring</i>	1962	Rachel Carson
17	<i>The Mismeasure of Man</i>	1981	Stephen Jay Gould
18	<i>The Man Who Mistook His Wife for a Hat and Other Clinical Tales</i>	1985	Oliver Sacks
19	<i>The Journals of Lewis and Clark</i>	1814	Meriwether Lewis and William Clark
20	<i>The Feynman Lectures on Physics</i>	1963	Richard P. Feynman, Robert B. Leighton y Matthew Sands
21	<i>Sexual Behavior in the Human Male</i>	1948	Alfred C. Kinsey et al.
22	<i>Gorillas in the Mist</i>	1983	Dian Fossey
23	<i>Under a Lucky Star</i>	1943	Roy Chapman Andrews
24	<i>Micrographia</i>	1665	Robert Hooke
25	<i>Gaia</i>	1979	James Lovelock

Discover Magazine. December 2006.

Books without adjectives

Mexican astronomer Guillermo Haro -who was in charge of National Astrophysics Institute of Mexico's creation- used to say that science could be distinguished from other intellectual activities, especially arts, because *we can't say contemporary humanists, writers or artists are better than those from the past, whereas current science is better than previous science and future science will be greater superior than current science*, that's why we can identify several efforts to incorporate science to citizen's cultural background finding contact point among "science & technology", "arts & science", "science & society" and others.

With regard to books, it is possible to locate some authors partially unconnected (ones more than others) to scientific communities, who have developed literary works -in the whole sense- which themes, characters or anecdotes related to science, since they are sure that scientific atmospheres, methodologies and facts inspire *good stories* to tell: Carl Djerassi, Alan Lightman, Dava Sobel, Jorge Volpi, they all are authors as Mexican physicist and writer Sergio de Régules would like to: *writers and nothing else; writers, not "scientific writers"*. Writers not limited to show definitions or to *repeat* examples; writers who construct situations, create atmospheres and make a whole story. Writers who change our way to see the world and to be on it.

To generate books is not an easy task. Medieval illustrator *Florencio* complains that *who doesn't write thinks it is effortless. But truly, to write is an immense job that takes away light from our eyes, bends our back, mortifies our stomach and rib, get pain to our kidney and causes tiredness to the entire body...*

The fact that many science books exist give us the impression that science is *accessible*. However, science books remain far away even from reading programmes, they are not visible in the majority book fairs or reading reviews, newspapers or radio and TV shows. Spanish journalist Javier Sampedro is right when he says: *the science book will be mature when it could renounce to its adjective*. Until science books stop being mere synopsis of *what we must know*; books seen as tools with *useful* data for *users*, it will be hard have readers who bring science to their lives. We need science books to share, books to be told instead of being commented or consulted. Books to read, memorable books, pieces of a library, as George Perec suggested: *a group of books collected by a no professional reader for their own pleasure and daily use*. Touching, exciting books to understand our questions, to surprise us, to recognize the unexpected spell hidden in daily, ordinary things.

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