



## interview with **Manuel Toharia**

Science Director of City of Arts and Sciences and Director of the Prince Felipe Museum of Science  
Valencia - Spain



The Hemisféric building in Valencia's City of Arts and Sciences © Matej Kastelic / Shutterstock.com

Born in Madrid on 3 August, 1944, he studied at the French Lycée in Madrid where he gained both French and Spanish qualifications (*baccalauréat Mathématiques Élémentaires*, and completion of a pre-university science course). He went on to study Physical Sciences at the *Universidad Complutense* of Madrid, specialising in Astrophysics and Cosmology. From 1969 to 1975 he worked as a career civil servant for the National Weather Service (Spanish Air Ministry).

As a professional communicator, since 1970 his activities have focused on journalism and popular science in the press, on radio, on television and in interactive museums. From 1970 to 1979 he was the science editor of the Madrid daily, *Informaciones*. From 1980 he directed and presented various cultural and scientific programmes for *Televisión Española* (Spanish TV), where he had worked as a science writer and weatherman since 1971. He was also a science writer for the Spanish newspaper *El País* from 1980-1981. He was involved in the launch of the *Muy Interesante* magazine in 1981, and in 1983 he established the scientific journal *Conocer*, which he ran until 1988.

Since then, he has worked on the production of popular science videos and television programmes and on the conceptual design of exhibitions and interactive museums devoted to science, technology and the environment. Since 1980 he has also had frequent spots on various radio stations, talking about topical scientific subjects, and he regularly collaborates with newspapers and magazines. He is a regular lecturer throughout Spain, giving around a hundred talks each year. He also teaches science journalism on the Master's course in journalism at the *Universidad Autónoma* of Madrid (UAM-El País School of Journalism) and at the Spanish Energy Institute. He has been the Director of the ACCIONA Interactive Science Museum (1995-1996) in Madrid, and of the "La Caixa" Foundation's Science Museum at Alcobendas (Madrid) (1997-1999). From September 1999 he was Director of the Prince Felipe Science Museum in Valencia, and is currently the Science Director of Valencia's "City of Arts and Sciences".

He is a member of the Spanish Association of Scientific Communication (and the Spanish representative at the European Union of Science Journalists' Asso-

# “Science is nothing more than the product of human curiosity”

“It is difficult to summarise 41 years of professional life. My persistent dedication to communication has been the key theme, focused almost always on the fields of Science, Technology and the Environment. Doubtlessly, my previous scientific training was a help to me here, at least at the beginning...”

ciations, EUSJA), a member of the Board of Directors of ECSITE (the European Network of Science Centres and Museums), Honorary President of the Saint-Exupéry Franco-Spanish Cultural Association, founding member of the Spanish Energy Club, the Spanish Waste Club, the Madrid Mycological Society and the Spanish Meteorological Association, founding member of the Spanish Academy of Television Sciences and Arts, and holds an Honorary Master's Degree from the School of Computer Science.

He has written 32 books popularising science, the latest being *Meteorología popular* [Popular meteorology] (1988, Editorial El Observatorio), *El libro de las setas* [The book of mushrooms] (1989, Alianza), *Tiempo y clima* [Weather and climate] (1990, Salvat), *El clima* [The climate] (1993, Orbis), *El desierto invade España* [The desert is invading Spain] (1994, Instituto de Estudios Económicos), *Astrología: ¿ciencia o creencia?* [Astrology: science or belief?] (1995), and *Micromegas: del dinosaurio amaestrado al agujero de ozono* [Micromegas: from the trained dinosaur to the hole in the ozone layer] (1996), both published by McGraw-Hill, *Medio ambiente, alerta verde* [Environment, green

alert] (1997, Acento Editorial, co-authored by Francisco Tapia), *El colesterol* [Cholesterol] (1998, Acento Editorial), *El futuro que viene* [The future that's coming] (1999) and *Hijos de las estrellas* [Children of the stars] (2000), both in *Temas de Hoy*, and recently *El clima, calentamiento global y futuro del planeta* [The climate, global warming and the future of the planet], published by Editorial Debate (2006, Random House Mondadori), *El mito de la inmortalidad* [The myth of immortality], co-authored by Bernat Soria, published by Editorial Espejo de Tinta (2007), and *Confieso que he comido* [I confess that I have eaten (my metabolic memories)] published by Editorial Le pourquoi pas (2008).

He has been awarded the Science Journalism Prize by the Spanish Council for Scientific Research (CSIC), the Prize for Popular Science Videos by *Casa de las Ciencias* (House of Sciences) in La Coruña, the SIMO Prize for Popular Science on Television, the Energy Saving Promotion Prize (Ministry of Industry), the Medal of Honour for Promoting Invention (García Cabrerizo Foundation) and the 2004 Prisma Prize for a life-long career popularising science, by the La Coruña City Council.



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**Was it tenacity or luck that enabled a physicist to become a television weather forecaster, as well as the best known and most recognized man of the day?**

Meteorology is the physics of the air, so moving into that field was a logical consequence –just one more option at a time when I was looking for work. And explaining the weather on television called for communication skills, at least back then– I began in 1969; in my case, those skills were probably inborn.

**How did you make the leap into journalism, leading to your role as a popularizer of science?**

It was a more or less inevitable progression. At the same time as my television work, while I was still a meteorologist with the Air Ministry, I started to work for *“Diario Informaciones*

*de Madrid”*, on a new type of supplement about science and technology, so I was dealing with subjects related to meteorology and general science every day. My daily contacts with television and the press (and very soon with radio as well) gave me an inside knowledge of journalism, as a good “apprentice” for many years. Many other stages in my career were to follow: I directed programs for *TVE* (Spanish Television); I was the science editor for *“El País”*, a daily newspaper; I founded and created *“CONOCER”* magazine; I produced video and TV programs on science; I was a scriptwriter for interactive exhibitions, and director of several museums... From 1976 onwards, I took extended leave from meteorology, and I have never returned to it. I can look back on 41 years of continuous involvement in these areas, not to mention the 36 books that I have written on these subjects.



**If we go beyond academic definitions, how would you describe science? Does it always have to be viewed from a dynamic perspective?**

Science is nothing more than the product of human curiosity, which makes us constantly ask ourselves why –and how– it is that things are as they are, how they work, and what advantages can be had from a better knowledge of everything that surrounds us... Animals and plants do not ask questions themselves; they simply do what their genetic message tells them to, in a predetermined way and with very few variations. Thanks to curiosity, human beings have developed a culture that is both instrumental –technology– and intellectual –science and art; it has given us some amazing advantages over our environment, even including remarkable ways of extending our life span, which was not very long to start with.

**Why has Spain shunned its scientists, or at least failed to encourage them?**

This has not always been the case, although the mystic, artistic and literary spirit has generally been far more predominant in this country than pragmatic, scientific and technical thinking. This is the opposite of what happens in other countries, especially the Anglo-Saxon countries in more recent times. Several centuries ago, we did not know how to take advantage of the Toledo School of Translators and the heritage bestowed upon us by the rich culture of the Arabs. After that, to some extent, we missed out on the technological revolution that started with the steam engine in England and continued in other countries. And then, in the twentieth century, apart from the two World Wars, our own Civil War did not do much to help the development of science in Spain...

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Maybe we missed a marvelous opportunity in the nineteenth century, when science began to flourish in an exciting way – in Valencia for instance, where Santiago Ramón y Cajal launched out on his brilliant career, and in other major universities too. But then, the twentieth century stifled virtually all of this impetus: the best scientists started their careers here, but went on to achieve prominence elsewhere. That applies not only to “our” 1959 Nobel laureate Severo Ochoa, but also to many others who may not have won a Nobel prize, but who took the best of Spanish science to other countries, mainly the United States.

**In spite of its shortcomings, science in Spain is enjoying something of a heyday at present, due to the huge influence of North America’s scientific leadership and the initiatives under way in Europe. But what must we still do to**



General view of the City of Arts and Sciences in Valencia

**make advances in every respect, quantitative as well as qualitative?**

It is becoming more and more difficult to talk about “Spanish” science, or “French” science, or indeed science in any single country. In an extraordinary way, science has become international over the last few decades. The major achievements and the most outstanding publications rarely –in fact, never– originate from one individual, but from many. Up to a hundred

scientists from numerous countries were involved in publishing the sequences for certain human genes, and each of them contributed something to this work. Is the work that many Spanish scientists are doing in the USA (or elsewhere) Spanish science, or American science? The financial and material resources come from America, of course, but what the scientists learn and what they perhaps bring back with them when they return (if they return), and what

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**Valencia’s City of the Arts and Sciences is a project that is unique in the world, and it certainly is the first of its kind. Some questions about the particular museum that you direct: How was it conceived? What was its mission? How will it develop in the future? And what legacy does it hope to leave?**

The philosophy of the City of the Arts and Sciences is enshrined in its own name: one single culture that integrates the sciences and the arts. Starting from there, each element safeguards one aspect of this integral culture that we aim to preserve: opera, ballet and chamber music in the Palace of the Arts, the interactive popularization of science and the debate about Science, Technology and the Environment in the Museum of Science; the popularization of natural (mainly aquatic) science at the Oceanographic Park; popularization of the arts, documentary material, exploration and innovation in the audiovisual sphere at the Hemispheric Theater; and the integration of modern sculpture into the greened urban environment in the Umbracle Park. All of these elements are accommodated in impressive architectural settings and structures that are the work of Calatrava, the Valencian architect – he truly is a prophet in his own country. The content is continuously renewed, with the result that about five million people visit the complex each year. I do not aspire to leave any particular legacy; as the scientific director of the complex, and formerly as director of the museum, my idea has always been the same: to convey interesting and curious aspects of the world of culture to the general public, with the aim of helping them to have a better understanding of the world in which they live, to enjoy more of its many benefits, and to find more efficient ways of resolving the equally numerous difficulties that it presents.

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**As risk is an inevitable element of progress, insurance aims to offer a way to redistribute risk and compensate losses**

they basically contribute to human knowledge – all of that is universal. Not just American... For scientists who were born and educated in Spain, the advances that they make on foreign soil entail better contact with the international research environment. And better integration into the productive environment, that is to say essentially, the world of private entrepreneurship; something that is far from desirable in Spain.

**Budgets allocated to scientific programs and to research, development and innovation have been**

**described as inadequate. The lack of opportunities for young researchers is prompting the large-scale export of brainpower that Spain is experiencing. How can this situation be changed?**

When you use the word “inadequate”, some explanation is called for, because science does not need to depend solely on public-sector budgets and R+D policies. Private enterprise in Spain has been, and generally still is, very reluctant to undertake research (or applied research) on its own behalf, or in cooperation with public scientific institutions. After all, our figures for public investment in this field are lower than those of the countries we would like to resemble, and when it comes to private research, they are actually far lower. On the other hand, it is no bad thing for us to export our best brains, even if they do not return later on; what we are really doing is to educate good scientists and technologists so that other countries can reap the benefits. In terms of the progress of science as such, it does not make much difference; but when we start talking about the economic aspects, we are clearly confronted with a bad deal. Changing the situation is not easy; maybe Spain trains more high-level scientists that its scientific, technological and entrepreneurial structure can absorb. And this inevitably leads to the exodus of brainpower – even more so in a world where international exchanges between such experts are increasingly encouraged.

**What role do scientists have in society, and who is responsible for popularizing science and scientific issues?**

Scientists are the foot-soldiers of a worldwide human mission that, throughout history, has enabled us to attain ever higher levels of well-being and longevity. That is their role; it is never-ending, and it becomes more difficult to comprehend as time goes on; and it is a role that the rest of the human race does not understand very well. This is what makes popularization so vastly important; the aim must be to build some bridges – building all of them would be an impossible task– between what science knows, and what society knows. Making science popular is no easy matter; in some ways, it is a sort of journalistic assignment, rather like that of a correspondent sent to a foreign country which in this case is the realm of science. To achieve this, it is necessary to have an adequate understanding of both worlds: the world of the street, and the world of the researchers. Popularization is a sort of on-going informal education for every citizen, and



it has to be financed by the public authorities in the same way as formal or controlled education. Also, it must be undertaken by those who know how to do it well, regardless of whether they were originally scientists, journalists or teachers.

**It is clear to me that a large section of the general public is highly interested in scientific developments and research results, which form the basis for our present and future well-being. Does society's support for its scientists lead to higher financial contributions?**

What you say about support from a good proportion of the population is definitely true, at least if you trust the answers that the Spanish give in surveys. But I very much doubt whether these answers reflect the deeper thinking of people who respond in this way. They answer like this "to make a good impression" – just as happened with the documentaries shown on the *TVE 2* television channel, which were the most interesting programs in the entire schedule, but nobody watched them. This support always becomes much more qualified when it is converted into money. And that is why, at the end of the day, it is not unusual for the politicians to allocate low funding to science.

**How do you perceive risks? In terms of popularizing science, what could be done about risks and their consequences? What is your view of insurance?**

It is a curious phenomenon that the longer we live, and the better we live, the fewer risks we are prepared to accept. We become more and more afraid that bad things could befall us, to the point where we even invent them for ourselves. However, it is obvious that there is no such thing as an activity that entails zero risk; the ecologists have sometimes propounded this myth, for example by demanding that certain industrial activities should not present any risk at all. So, knowing that risk is an inevitable and also necessary element of progress, it seems obvious that we should be ready to do everything we can to minimize it and, on the other hand, that we should try to compensate for damage or losses if they occur –which is always possible– by means of some sort of system that redistributes risk and provides compensation. Such as the insurance sector, for example, not only in the context of science and the advances that it achieves, but also at all other levels of everyday life.

### Mr. Manuel Toharia's observation

I would just like to recall that there would be less bamboozling if there were not so many unwitting victims ready to be bamboozled. And the way to reduce the number of unwitting victims is simply to provide a little more integrated culture for the general public – culture that must be favoured and fostered by the public authorities as well as by private initiatives. We shall all emerge as winners if we fight this battle in the right way.

