

The Mediterranean, bridge of cultures. Lectures at the AE-BKH in 2014

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Trencadís ("broken tiles") by Antoni Gaudí

Summary. Activities of the Barcelona Knowledge Hub of the Academia Europaea (AE-BKH) on 27-28 November 2014. The article describes the lectures given for the *Disputatio of Barcelona 2014* on "The Mediterranean, bridge of cultures", by Enric Banda and Maria Paradiso, at the Sant Pau Art Nouveau Site, Barcelona (27 Nov.), and for the Intersection Workshop (ISW-AE) on "The Mediterranean in the crossroad: Past, present and future", by Jean-Pierre Brun, Isabelle Anguelovski, Ricard Guerrero, Rubén Duro, Alessandro Tessari, Marc Mayer, and Salvador Giner, at the Institute for Catalan Studies (28 Nov.). The ISW-AE was followed by a visit to the CosmoCaixa museum of science, and a choral concert by Cor de Música, from Castelldefels, which sang Medieval songs at the main auditorium of the museum. [Contrib Sci 12(2): 117-127 (2016)]

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"The Mediterranean, bridge of cultures", the *Disputatio of Barcelona 2014*

The Barcelona Knowledge Hub of the Academia Europaea (AE-BKH) was set up in 2012 as the Academy's regional office

for Southern Europe and the Mediterranean. The hub's mission is to organize scientific activities that include the perspective of the sciences and the humanities. One of its main annual events is a modern day *Disputatio of Barcelona*. Having originated in the Middle Age as a formalized method of

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Fig. 1. (A) Main entrance of the Sant Pau Art Nouveau Site in Barcelona (formerly, Sant Pau Hospital), the place where the *Disputatio of Barcelona 2014*: “The Mediterranean, bridge of cultures”, took place on 27 November 2014. (B) Authorities and lecturers at the *Disputatio of Barcelona 2014*. From left to right: Antoni Castellà, Maria Paradiso, Parvati Nair, Enric Banda, Anne Buttimer, Andreu Mas-Colell, Theo D’haen, Genoveva Martí and Ricard Guerrero. (C) Social mixing after the lectures of the *Disputatio of Barcelona 2014* at the Sant Pau Art Nouveau Site.

debate, the present-day *Disputatio of Barcelona* aims to present two unique disciplinary angles—scientific and humanistic—on a given topic.

The *Disputatio of Barcelona 2014*: “The Mediterranean, bridge of cultures” took place on 27 Nov. at the Sant Pau Art Nouveau Site in Barcelona and it was organized in conjunction with the United Nations University Institute on Globalization, Culture and Mobility (UNU-GCM). The event was inaugurated by Anne Buttimer, Vice-President of the Academia Europaea, Ricard Guerrero, Academic Director of the AE-BKH, and Parvati Nair, Founding Director of UNU-GCM.

The two speakers were Enric Banda, Director of Science and Environment at “la Caixa” Foundation and Member of the AE, who discussed “Science as a Mediterranean bridge”, and Maria Paradiso, Professor of Geography and Planning at the University of Sannio, Italy, who spoke on “The Mediterranean: bridging, bordering and cross-bordering.” (Fig. 1)

Enric Banda demonstrated the important geophysical transformations of the Mediterranean Sea over time and

how the *planet on its own has tailored the Mediterranean region*. Science was born along the Mediterranean. The exchange of ideas, through travel and commerce, encouraged Mediterranean civilizations to recognize that nature could be understood in itself and not merely listening to gods. He explained how the Mediterranean approach was decisive because it opened the road to intellectual challenges, the idea of progress and the development and democratization of knowledge. He highlighted that science is essential for addressing the current challenges of sustainability in the region and how responsible research and innovation, in collaboration with society at large, will be the way to connect both shores of the Mediterranean.

Maria Paradiso proposed to view the Mediterranean region as representative of a global, mobile reality. She argued that the idea of *unitary Mediterranean* is a fiction that has been upheld by popular visions based on cultural stereotypes. The Mediterranean today is a space associated with fractures, borders and securitization. She proposed instead a

Academia Europaea Barcelona Knowledge hub	
	
Academia Europaea InterSection Workshop: The Mediterranean in the crossroad. Past, present and future	
Friday, 28 NOVEMBER 2014	
Institute for Catalan Studies (Coromines Room) and CosmoCaixa (Agora Room)	
FIRST SESSION: IEC	
09.30 h	WELCOME
Convener:	Genoveva Martí , University of Western Ontario
09.45 h	<i>Inaugural Lecture: The origin of the Mediterranean and the Messinian crisis</i> Jean-Pierre Brun , University of Rennes
10.30 h	Urban and environmental planning in the Mediterranean Isabelle Anguelovski , Institute of Environmental Science and Technology, Autonomous University of Barcelona
11.15 h	PAUSE
Convener:	Maria Paradiso , University of Samio
11.45 h	The Mediterranean's deltas: Early life and late culture Ricard Guerrero , Barcelona Knowledge Hub, <i>Academia Europaea</i>
12.30 h	Film: The other submerged "treasures" of the Mediterranean Rubén Duro , scientific photographer, Barcelona
SECOND SESSION: IEC	
Convener:	M. Dolors Garcia-Ramon , Autonomous University of Barcelona
15.00 h	Ramon Llull, the first proto-European Alessandro Tessari , University of Padua Film: <i>The Art of Ramon Llull</i>
15.45 h	The demography of the first Mediterranean global network: The Roman Empire Marc Mayer , University of Barcelona
16.30 h	PAUSE
17.00 h	<i>Closing Lecture: The Mediterranean of the 21st century: Problems and opportunities</i> Salvador Giner , Emeritus, University of Barcelona
17.45 h	Conclusions and Perspectives: Maria Paradiso
18.00 h	Departure by bus for CosmoCaixa
THIRD SESSION: CosmoCaixa	
19.00 h	Visit to the exhibition " The Mediterranean as you've never seen it before "
20.00 h	Concert Veus Cor de Músic . Medieval songs from the <i>Llibre Vermell</i> de Montserrat Director: Manel Cubeles
20.45 h	RECEPTION

Contrib Sci

Fig. 2. Programme of the InterSection Workshop on "The Mediterranean in the crossroad: Past, present and future", held at the Institute for Catalan Studies on 28 November 2014.

view of the region based on flows, on networks, the circulation of ideas, people, finances, etcetera. In her approach, the *mobility* paradigm is explored as an initial approach to contemporary geographies of the Mediterranean created not only by media, powers and ideologies, but also by everyday people's interethnic, intercultural and emotional interaction.

The Mediterranean thus appears as a global web of confrontation, emulation, opposition, dialectics and change. She concluded that if we examined the potential of digital networks to create new solidarities and mobilities, we could reconstruct the Mediterranean as a space for the pursuit of dignity.

“The Mediterranean in the crossroad”, an InterSection Workshop of the AE-BKH

Within the framework of the modern-day *Disputatio of Barcelona*, the BKH organized the first AE Intersection Workshop (AE-ISW) with the aim of discussing interdisciplinary issues and topics with a regional dimension. “The Mediterranean in the crossroad: Past, present and future” was held on 28 November, 2014, at the Institute for Catalan Studies in Barcelona.

The speakers, all from diverse scientific backgrounds, were Jean-Pierre Brun, from the University of Rennes, Isabelle Anguelowski, from the Institute of Environmental Science and Technology of the Autonomous University of Barcelona, Ricard Guerrero, from the AE-BKH, Rubén Duro, biologist and scientific photographer, Alessandro Tessari, from the University of Padua, Marc Mayer, from the University of Barcelona, and Salvador Giner, professor emeritus of the University of Barcelona (Fig. 2).

The multidisciplinary journey started with the geological origin of the Mediterranean; its early life from a microbiological perspective; the demography of the first Mediterranean global network—the Roman Empire—; a study of Catalan philosopher and writer Ramon Llull (1232–1316) as the first proto-European; a sociological view on the region’s problems and opportunities, and an analysis of Barcelona as an example of urban and environmental planning in the region.

The origins and plate tectonics of the Mediterranean

The present-day Mediterranean Sea is a remnant of the western arm of the Tethys Sea, the ocean that coexisted between the continents of Gondwana and Laurasia during much of the Mesozoic era. The Mediterranean is a closed sea surrounded by mountain belts, which resulted from the shortening of plates. It appeared less than 60 million years ago, quite recently from a geological perspective, and it is still a very tectonically active area. Nowadays, Anatolia is moving westwards and Greece is moving towards the southwest up to 3 cm per year (Fig. 3).

Tectonic plates can diverge to give ocean openings and they can also converge by subduction, producing a shortening of the plates that results in a mountain belt. Plate divergence (e.g., the Atlantic) is compensated by plate convergence (subduction, e.g., Andes). By measuring the age of the

plates under the ocean we know that the oldest plate is very young compared to the age of the Earth. The age of the ocean floor is <180 million years (Ma), so we know that oceanic plates are permanently renewing.

A big improvement in our understanding of the relation between the plates and the mantle below came thanks to seismic tomography. Seismologists place seismometers at different places on the surface and record the seismic waves coming from earthquakes from all around the Earth. It is a matter of calculation, converting millions of rays and then calculating the velocity that these waves have below the different places we want to study. This technique has allowed geologists to study how the African plate is going down, it is subducting below the Anatolian plate, just south of the Peloponnese. This explains all the earthquakes in the area around Greece.

Geology also allows us to know the timing of events, the type and date the rocks, when volcanoes are functioning, and where the sediments are depositing, helping us to relate present-day geology to history. Thanks to paleomagnetism, the study of the record of the Earth’s magnetic field in rocks, sediments and archaeological materials, we can see if some pieces have rotated and how much they have rotated. The datasets collected from the surface help reconstruct the present-day subduction.

In the Iberian Peninsula, there is a subduction of plates almost perpendicular towards Italy. It is a case called *subduction rollout*, where the tip of the subduction is moving in the reverse sense of the sense followed by the plate to go into the mantle. On top of the down-going plate there are back-arc domains and in these domains there are high-pressure metamorphic rocks that have gone down, undergone changes and then come up again with fossils during the rollout.

These high-pressure rocks, blueschists and eclogites, which can be found in the Aegean, have recorded an increase followed by a decrease of pressure. Thanks to thermodynamic analysis of the minerals, scientists can measure the pressure that the rock has supported, and with the use of isotopes can date the minerals that crystallized. In other words, it is possible to know the pressure at a given time.

The Messinian salinity crisis. The Messinian salinity crisis was a geological event that took place between 6.0 and 5.3 million years ago, whereby the Mediterranean went into a cycle of nearly complete desiccation. Geologists have been trying to understand this problem for the last 25 years.

In the 1970s, using seismic exploration data, it was discovered that there was a layer of evaporates (salt) deposited



Fig. 3. The Mediterranean Sea, that can be considered the largest “lake” in the world. Many cultures and most of the scientific knowledge started around its shores. (From the lecture by Dr. Ricard Guerrero at the 28 November, 2014 Workshop, in Barcelona. About Alexandria, see also the article by Carmen Chica, pp xx-xx, this issue.)

on the Mediterranean seafloor [1]. A hypothesis was put forward of the desiccation of the Mediterranean as responsible for salt deposition. At the time, most members of the scientific community thought this was absolutely crazy, and strong disputes remain to this day.

However, one thing most agree on is that there were two main successive events of evaporite deposition: gypsum– salt. Strontium (Sr) isotopes in gypsum and carbonates as a function of age show that event #1 resulted from sea water evaporation then supplied from Atlantic waters and event #2 resulted from the river waters from surrounding continents. During this 700,000-year period, rivers incised their bedrocks by up to 1600 m with regard the present-day level of the river. This is because if the level of the sea goes down, the river will follow, decreasing its levels as well. In other words, the demonstration of the Messinian salinity crisis was made by the rivers. It was thought originally that the slab rollback was responsible, but it actually ended before the onset of the crisis. More probably, the slab rollback prepared the crisis, but was not enough to justify it.

The Gibraltar Strait is the symbol of the Messinian salinity crisis. Reflooding of the Mediterranean happened through the Gibraltar strait, with a discharge of 10^8 m³/s, three orders of magnitude larger than the present-day Amazon River flow. All these events reinforce the idea that the Mediterranean is a living geological system, expected to disappear in some 10 million years.

Mediterranean deltas: early life and late cultures

It has been estimated to be more that 30 million of current species, and we know that many more species have lived and have become extinguished [8]. Biological communities are usually stratified, because of light extinction with depth. Tropical forests, planktonic communities, stratified lakes, and microbial mats can be considered as analogous forms at different scales. The photosynthetic layer expands for many meters in tropical forests; from a few meters to a few centimeters in multi-layered planktonic microbial communities, and for a few millimeters in microbial mats.

Microbial mats are highly diverse, physically and chemically active systems and are considered to have constituted early ecosystems, probably the earliest ones. The microorganisms in mats or in complex biofilms form coordinated functional communities that are much more efficient than mixed populations of floating planktonic organisms. The survival value of this strategy in the environment of the early Earth can be considered the main clue to the resilience of life against adverse environmental conditions [7].

The five largest Mediterranean deltas. The Rhône and the Ebro deltas, where microbial mats occur all along the coast, offer an ideal scenario to study them, and thus early life on our planet. As proposed by Prof. Ricard Guerrero, in accordance with Prof. Ramon Margalef (1919–2004), life

started several times on Earth. Why is life only present in the Solar System, as we know now? It is thanks to bacterial “invention” of the ecosystem: if only one species were to be present, nutrients would disappear; but in ecosystems, bacteria are able to recycle scarce and limited chemical elements, nutrients and energy. These coordinated functional communities subsequently allowed the evolution of more diverse forms of life and the persistence of life as a planetary phenomenon.

Together with the Ebro and the Rhône deltas, the Po, the Danube and the Nile rivers represent the five largest deltas in the Mediterranean. Today, these landforms have been designated as protected areas or natural parks, such as the Po or the Ebro deltas, or are considered rich agricultural regions, such as the Nile Delta. However, looking back in history, deltas were associated to the idea of being places of illness and desolation.

Disease-carrying mosquitoes abounded in these areas and it was not possible to hunt or to grow anything in them, factors that surely played a role in culture developing very late around deltas. Approximately 200 years ago, however, it was discovered that rice could resist the salinity found in deltas. Besides, rice can grow thanks to the presence of *Azolla* sp., an aquatic “fern” which carries a nitrogen-fixing cyanobacteria that later releases the nitrogen needed for the plant’s growth. Around the planet today, deltas are at the heart of the rice producing areas and key to the world food supply (Fig. 4).

Of microbes and men. Humans live in a dynamic state of coexistence with a myriad of forms of microbial life. Nobody denies that pathogenic microorganisms have posed a threat for both humans and other forms of life. We can thus consider humans, or the human body, as an additional scale.

Many diseases have been related to deltas, such as malaria, yellow fever, or filariasis. But there are other, such as the plague, that devastated the Mediterranean as a whole, killing 30–60% of Europe’s total population between 1346–1353. The Black Death, caused by the bacterium *Yersinia pestis*, is thought to have been carried by fleas found on the rats aboard merchant ships and to have spread from Genoa to the rest of the continent. It had profound effects on the course of European history and has been the subject numerous paintings, such as Peter Bruegel’s (1525–1569) *The Triumph of Death* (1562), or books such as Giovanni Boccaccio’s (1313–1375) *Decameron* (1351).

The Black Death is probably the best known pandemy and it has been credited with ending medieval culture and thought.

But another Italian city, Naples, and another epidemics, syphilis, marked the beginning of the Renaissance. Known also as *morbus gallicus*, *hispanus* or *germanicus*, its name is derived from the epic poem written in 1530 by Girolamo Frascatoro’s (1478–1553) *Syphilis sive morbus Gallicus* (his 1546 book *De contagione et contagiosis morbis* also provided the first description for typhus). Syphilis started abruptly at the end of the 15th century and had three distinct features: rapidly spreading epidemics, sexual transmission, and a quite visible and apparently serious symptomatology. Syphilis, caused by the bacterium *Treponema pallidum*, was a disease that men contracted mostly through contact with prostitutes. At the beginning of the 20th century, it was still the most feared sexually transmitted disease, not only by the effects and complications it could cause in the affected people, but also because the public recognition of the disease was a social stigma [5].

But microbes may also be responsible for certain *miracles*. The bacterium *Serratia marcescens*, which produces a red pigment, is responsible for the Miracle of Daroca (1238) and the Miracle of Bolsena (1263), where Mass hosts were found soaked in “blood,” or account for the *miraculous* appearance of blood on the Eucharist that led to Pope Urban IV (1195–1264) instituting the celebration of the Corpus Christi in 1264 [6].

A great majority of the species that are now or have been on Earth are microorganisms. The interactions between humans and microorganisms have very important consequences that, either positively or negatively affect our species. Microorganisms are the main agents of biogeochemical cycles of the elements of the biosphere but they also cause infectious diseases. However, all organisms have learned to coexist with microorganisms and today we know that most numerous and representative interactions between microorganisms and other organisms are not pathogenic but symbiotic. In fact, humans still inhabit the Earth because the pathogens that have attacked us can *benefit* of our survival. Microorganisms contribute to the biosphere with more benefits than disadvantages. The extreme metabolic and ecological variety of the microbial world represents a wide, unexplored resource for biodiversity of great value for the future [8].

The Roman Empire, the first Mediterranean global network

The present-day situation of the Mediterranean Sea and the conflicts that arise in its proximity are undoubtedly a topical subject, one that frequently gives rise to dramatic situations. The demographic study of the Roman world can provide a

Fig. 4. Detail of *La Malaria* (1850-1851), oil on canvas by French artist Antoine Auguste Ernest Hébert (1817–1908). Hébert's painting conveyed admirably the melancholy of diseased country people and the blurring pestilential environment where they lived. The *malaria* (bad air) can be indeed perceived in the painting, one of the best-known works of the artist. This painting was on the cover of *Int Microbiol* 2006, issue 9(2).



better understanding of this inland sea, the *mare internum*, in order to obtain a broader historical perspective that can clearly be projected onto the world of today. The contribution that the study of the World of Antiquity can make to all these questions is substantial even though the chronological distance might lead one to think that such a remote period is unlikely to have had much bearing on the contemporary situation. (For a full analysis on the topic, see: Mayer M, 2015, in this issue of *Contributions to Science*, pp. 49-58.)

Ramon Llull, the first proto-European

Born in Majorca in 1232, Ramon Llull was a prolific and multi-faceted writer and philosopher who wrote in Catalan, Latin and Arabic. Llull lived in the period of the late Middle Age, considered historically as irrationalistic times, but together with Roger Bacon, Grossatesta, and the Calculatores of Oxford, he was one of the men who announced what was to come a few centuries later: the scientific revolution. The heart of Llull's contribution resided in what he called the *Art*, a general system for the interpretation of visible and invisible reality, which made use of semi-mechanical techniques, symbolic notation and combinatorial diagrams. The *Art* provided a single methodological basis for all fields of knowledge in the 13th century, from theology to the natural and the human sciences, and many people consider this was the start of modern computer science.

Modernity and the Mediterranean

The history of the Mediterranean is the history of its cities,

and the modern world owes its origin, to a large extent, to Mediterranean cities. French poet Charles Baudelaire is credited with coining the term *modernity* to designate the ephemeral experience of life in an urban metropolis. Modernity arose in post-Medieval Europe, with academics still disputing whether it started in the 14th or 15th centuries.

However, some argue that, from an urban point of view, modernity was already underway the 12th century in the Mediterranean cities of Florence, Milan, Genoa and Barcelona. Modernity was later triggered by the creation of the stock exchange, an Italian invention and today a pillar of ultramodern capitalism in Wall Street and in the City. Private limited companies and currency exchange, both Catalan inventions, were also elemental, exemplified by double entry books, debit and credit, the application of rationality to accounts, accounting tables, and the invention of balance.

As the initiative of the modernizing era was being displaced towards north-western Europe, the south did not follow the pattern of the mostly protestant, industrialized north. The Mediterranean arc remained stagnant and backwards in a peculiar situation which later led to its countries to the failure of the industrial revolutions. Some cities such as Venice, managed to maintain prosperity during the long period of decline in the Mediterranean. And areas such as Catalonia and Piedmont, around their capitals, Barcelona and Turin, evolved to become bourgeois societies and then advanced more naturally towards an industrial capitalism. But this was not usually the case [4].

All of southern Europe shares a very similar process of modernization. Over the past 200 years approximately, there has been a sequence of stages of economic and political development taking place in Portugal, Spain, Italy and Greece,



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About the author

Nicole Skinner is a biologist (University of Barcelona, 2006) specialized in the communication of science. She received her Professional Master Degree in Scientific, Medical and Environmental Communication by the Pompeu Fabra University in 2007, and her MSc in Science Communication by the Imperial College of London in 2014. Currently is Managing director at Pilvertees UK and Science communication manager at Cancer Research UK. Between 2006 and 2014, she developed different activities for the Institute for Catalan Studies (research and editorial assistant, science journals editor, science advisor) and for the Barcelona Knowledge Hub of the Academia Europea (AE-BKH) (Hub officer). She is also science writer and translator, and from 2009 to 2013, she was Managing Editor of the Contributions to Science journal.

that present incredible synchronicity despite taking place in such diverse countries. In all these countries, an initial stage of elitist, oligarchic government was followed by imperialist wars and later fascist dictatorships.

If we look at Lisbon, Madrid, Rome and Athens, the state was interventionist, but not in a truly modern sense. In people's opinion, the capital embodied certain negative traits. It was distant, frightening and *guilty* of many national ills. At the same time, it was also a powerful pole of attraction generating employment, power and prosperity.

But the growth of commercial and industrial empires, far

from the political capital, illustrated the divorce between the political and the civil society. We can even say, with due caution, that in some Mediterranean countries a proverbial "Tale of Two Cities" took place reproducing this important dichotomy. Until very recently, and to a lesser extent today, many observers considered Spain and Italy as two-headed countries, each with two metropolises. Milan and Barcelona, Rome and Madrid became paradigmatic examples of industry and bourgeois society on the one hand, and political and administrative power on the other. The culture and attitude of the bourgeois cities was based on the flourishing of their civil societies, the cult of private enterprise, competition and progress without any further state support than protectionism, in some concrete cases. In the political capital, however, oligarchic governments and the mentality of class privilege dragged the state machinery and promoted state-ism and bureaucratic parasitism. This urban, metropolitan dichotomy that developed in Italy and Spain during most of the 19th and the beginning of the 20th century could easily be extended to Turkey, with the polarity represented by Istanbul and Ankara, to Greece, with Athens and Thessaloniki and, to a lesser extent, to Portugal, with Lisbon and Porto [4].

Any consideration of any important facts of Mediterranean societies must address the reality of their dualism, their ambiguities, and even their duplications. These countries have historically represented an obstacle to modernization, but they have also been a stimulus for what was once called progress, in that they have constructed or implemented industrialism, capitalism, literacy, socialism and many other forces of modernity.

Urban planning in the Mediterranean

Urban planning in global cities is influenced by sources and investments that create different patterns of revitalization and inequalities. In the 21st century, cities are not necessarily seen as the main actors of globalization, but just as nodes around which real estate companies, banks and industries move, looking for the most attractive one, the one with the best tax breaks or better conditions to develop their projects. Thus cities become mere tools for those stakeholders.

Spatial concentration of resources and uneven development due to investments moving from place to place in cycles of growth, devaluation, destruction, reinvestment, and mobilization mean there is great spatial inequality between areas of land that will be abandoned and others that will be used as new spaces of regeneration, with the emergence of

greater patterns of equality, but also patterns of inequality due to gentrification.

Urban planning in global cities. Cities are nodes within a global network of financial services and corporate headquarters that attempt to efficiently organize the internationalization of production, finance and information.

If we compare Barcelona to other contexts, we see that, in the USA for example, the growth of suburbanization sprawl has turned into decreased job opportunities and neighborhood degradation for the people who live in the inner city [10], combined with a recent revaluation of inner city life and amenities. Cities such as Philadelphia, Boston or Houston, for example, are all seeing an influx of younger people coming back to the city. In Europe, there tends to be a mix of traditional working-class residents in central neighborhoods with professionals seeking to move to the urban cultural centres and with new immigrants overpopulating deteriorated districts, for example, the Raval neighborhood in Barcelona [2,3]. And in the Global South, there are extreme patterns and extreme contrasts of wealth and development and poverty in very close spaces, like the case of Beirut. In rapidly urbanizing mega-cities, transnational flows of investment, information and production are transforming the urban space. Developers and real estate actors put strong pressure on urban lands and territories. On the one hand you have informal settlements (such as *favelas*) and very close new areas of wealth and luxury housing can be found.

One of the most acute forms of vulnerability in cities today is linked to the right to housing. Over the past decade, housing has become an object of speculation and of wealth

creation rather than a right. Between 2002 and 2007, Europe experienced a housing bubble with prices rising 6% per year. In Spain, particularly, real estate rocketed, with the national average house price increasing by 250% between 1996 and 2007. Furthermore, housing equity policies declined, as did government support for housing subsidies.

This situation led to the “Right to the City Movement”. Also known in Spain as the “15M”, this citizen movement claimed that cities are not meant to be for the profit of developers but for people, demanding the right to housing, the right to participation and transparency in decision making, as well as environmental and economic justice.

Urban planning and the rebirth of Barcelona.

The city of Barcelona offers an interesting case study as to how do urban revitalization policies create new conditions for socio-spatial inequalities and furthermore, how urban residents can challenge these inequalities and attempt to create new planning practices.

As the first democratic government came to power in 1977, it tried to respond to residents’ demands for improvements on living conditions that had been neglected during the Franco’s dictatorship: housing, transportation, safety and public space. The idea was to transform the image of the city as a “Catalan Manchester” into that of multi-dynamic, multi-sectorial city with a new physical structure, economic base and social composition [11]. This was accomplished by creating new monument designs, increasing the cultural and architectural visibility of the city and improving the image of Barcelona through marketing of its touristic, cultural, and recreational, architectural attractions.

Table 1. Stages of development of Barcelona’s redevelopment

Stage	Description
The Barcelona of the neighborhoods (1978–mid-1980s)	150 projects transformed the quality of public spaces and neighborhood plazas with attention to social needs. Urban planning was done in conjunction with the residents, using their knowledge and the power of the community.
Olympic Games preparation (1986–1992)	Massive transformation. The city turned towards the sea (the waterfront was revitalized, sport and recreational installations appeared, waterfront was rebuilt). The city became a space for recreation. It created a whole new neighborhood.
Post-Olympics era	Improvement of international markets and promotion of the city. Promotion of fairs and congresses. “Barcelona more than ever”. Promotion of the city as a center of design and knowledge.
Barcelona new projects	Rebuilding of poor areas that led to social inequality in the city. Emphasis on sustainability, new transportation and creation of new spaces through Agenda 21 program.
Knowledge city and smart city [8]	New forms of knowledge-based growth through the deployment of information, communication technologies and green technology. A more efficient and less resource-consuming city.



Fig. 5. Activities of the AE-BKH on 28 November 2014. **(A)** Lectures in the InterSection Workshop at the Institute for Catalan Studies. Alexandro Tessari is speaking of Ramon Llull (1232–1316), showing the influence that this medieval writer had on European philosophy and architecture even centuries after his death. One example is El Escorial Monastery, by Juan de Herrera (1530–1597), inspired in Lullian’ conceptions. **(B, C, D)** Activities at the CosmoCaixa science museum: **(B)** Visit to the exhibit on the Mediterranean. **(C)** Choral concert by “Cor de Música”, from Castelldefels. **(D)** Social mixing after the concert.

The city was redeveloped around the 1980s Special Plans for Interior Reform (Planes Especiales de Reforma Interior, PERI) in five stages (Table 1) and a lot of emphasis was placed in the regeneration of public spaces (libraries, community centers, gyms, schools) and investment in degraded areas of the city. The problem is that this was accomplished often on a huge scale and with block demolitions, in the end becoming very criticized and controversial projects, as they affected the social fabric of the city.

Community-based regeneration. There are, however, examples of residents coming together to try to have a voice in the decision-making process of a neighborhood to be regenerated. This is the case of the “Ciutat Vella”, or old town, in Barcelona. In the 1980s and 1990s, 2000 residents were displaced and 1078 buildings destroyed during the initial revitalization of the old town. While big parts of the neighborhood were being destroyed, there was no long-term, sustainable and equitable vision in the process. In 2001, 175 buildings were in bad shape, including 35 of them in ruins, and they had poor sanitation conditions on top of inferior waste collection and management. Several street corners in the area were abandoned with debris and waste

accumulation. There was high drug consumption, the health centers were high in demand and usually overcrowded, and in addition, there were fewer opportunities for recreation.

In response, the residents rebuilt the neighborhood, using do-it-yourself (DIY) techniques and thanks to their own capacity to raise funds, materials, trees, etc. The Municipality had no choice but to pay more attention to this space, and a 2.8€-million investment in water, light, gas, a sewage infrastructure followed. There were also education campaigns about recycling practices to improve waste management and two new community centers were built. Most importantly, perhaps, priority was placed in improving the wellbeing and quality of life, especially in marginalized or vulnerable populations, by targeting both physical health (clean air, soil, nutrition, places for play, recreation, education, physical activity, healthy homes) and mental health (nurturing, healing, protecting, wellness). As a result of these community initiatives, it became a socially, ethnically and economically vibrant neighborhood.

Why did the residents put so much energy into revitalizing this area? The years of neglect and destruction from the city had created a form of loss and trauma that led to com-

munity engagement. This was reinforced with the positive place connection and attachment to the neighborhood, not only as a motivator for the residents, but also a goal, meaning people were very attached to the “village” relations the neighborhood had created, to the landmarks, and to the history of the area. As many of them stated, they “wanted to have a say, at the local level, of the way our city is changed.”

Visit to CosmoCaixa: exhibit on the Mediterranean and choral concert

After the sessions in the IEC, the participants in the workshop went to the “CosmoCaixa” science museum to visit the exhibit “The Mediterranean as you’ve never seen it before”. Afterwards, to end the celebration of the 2014 InterScience Workshop, the choral “Cor de Música”, under the direction of Manel Cubelles, interpreted several Medieval songs from the *Libre Vermell* de Montserrat. (The 14th-century manuscript was compiled in and is still located at the monastery of Montserrat, Barcelona.) (Fig. 5). 

Competing interests. None declared.

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About the images on the first page of the articles in this issue. Articles of this thematic issue of CONTRIBUTIONS TO SCIENCE, devoted to the activities of the Barcelona Knowledge Hub of the Academia Europaea (AE-BKH), show in their first page a reproduction of a *trencadís*, a type of mosaic used in Catalan Modernism, made from broken pieces of ceramics, like tiles and dinnerware. Those nine “broken tiles,” designed by the architect from Reus Antoni Gaudí, show multiple angles and views, reflecting the ever-changing reality around us. The AE-BKH believes that those images, created more than a century ago, represent appropriately the multiple aspects of the present academic world, both in science and humanities, which constitute one of the main objectives of the activities of the Barcelona hub. See also the article “Antoni Gaudí (1852–1926): The Manuscript of Reus,” by R. Gomis and K. Katte, on pages 145-149 of this issue. This issue can be downloaded in ISSUU format and individual articles can be found at the journals’ repository of the Institute for Catalan Studies [www.cat-science.cat; <http://revistes.iec.cat/contributions>].