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Opening Lecture

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Opening Lecture

Exploring materials, Techniques, and Technological Advances for conservation, urban restoration, and management of cultural heritage in the new era

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(Conservation of Monuments in the Mediterranean Basin)

Authorities, Colleagues, and Participants all,

I have deep gratitude for all those who made it possible to continue, after the Covid pandemic, the route of our Conferences dating back to 1989. Allow me to open the Symposium with the preface **(fig,1)** of the first notice: "with great joy, but also emotion, we are pleased to announce that the University of West Attica, the National Technical University of Athens, the IUAV Architecture University of Venice and the Aristotle University of Thessaloniki will organize the 11th International Symposium on the Conservation of Munument in the Mediterranean Basin. The seven years that have passed since the organisation of the previous Symposium have changed the world and each of us personally. The COVID-19 pandemic, the war in Ukraine, and the subsequent economic crisis made it impossible, from both practical and ethical perspectives, to organize the Monubasin Symposium.

Figure 1

The Symposium opens today under the auspices of the International Group IGCMM that I have the honor of coordinating **(fig.2)**. Without the collaboration of our Universities and without sharing the organizational efforts made by the professors Maria Koui and Dimitrios Kouis, who carried out the preparation of the works with admirable competence, it would have been difficult to find ourselves in Athens to present and discuss the scientific contributions on the protection of the cultural heritage.

Figure 2

The values shared by IGCMM International Group are the monuments of the Mediterranean Basin **(fig. 3), which saw the birth and development of the great civilizations of the past and which guard the most important historical, archaeological,** and artistic patrimony of the world. Monuments and archaeological sites are integral to the history of cities and territorial colonization, in which humans have operated, and are today considered identity values by the communities that live there.

Figure 3

The monuments marked the most significant stages of antiquity, and although very little remains of those from the prehistoric period, the settlement structures and the multiplicity of coastal colonization characterize the urban polycentrism typical of the Mediterranean area.

History reminds us of the sacred rite of city foundation (**fig. 4**) and territorial colonization, during which monumental works dedicated to the gods were constructed. The spatial models and foundation rites were linked to hierarchical subdivisions and religion, and at the same time allowed citizens to recognize the reasons for choosing the site. In ancient times, city and community coincided: the all-encompassing enclosure of the former physically contained and socially identified the latter. Territorial control and the urban function, which are at the origin of the occupation of space and environment, have occurred according to a progression of civil society progressively extended from the Mediterranean towards the west. Protective walls and urban communities have constituted a widespread reality throughout the Mediterranean area. Of course, not all defensive walls were the same, as their design depended on the technological development of the citizens and were a function of the political and military concepts.

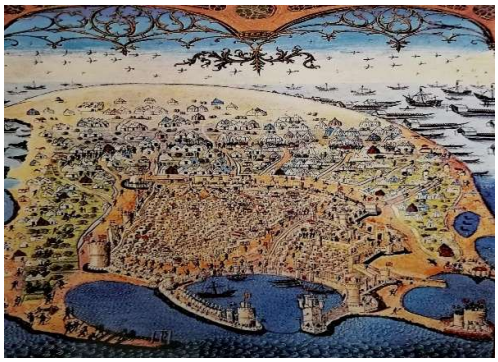

Figure 4

Athens **(fig.5)**, the most emblematic example in the history of symbiosis between political structure and society, built a huge fortified corridor among two parallel courtains, the so called Long Wall, in order to link the city to the fortress of the Pireo Harbour, for the supplies that the ships brought by sea and to organize their expeditions Many cities flourished in subsequent times were equipped with monuments and powerful defensive walls and continued to follow strategic and urban planning capable of interpreting the value of the sites and protecting the communities.

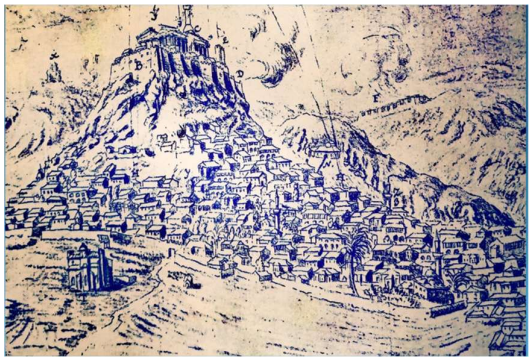

Figure 5

Nowadays, cities **(fig. 6) and citizens no longer seem to** recognize each other. Modern metropolises are often besieged by traffic and air pollution, eroded from within by the extension of tertiary consumption, degraded by dizzying expansion and the progressive loss of identity. Architectural historian Joseph Rykwert said that our cities seem the furthest from having an idea of themselves.

Figure 6

From this context emerges the scientific interest of the International Group, which, rather than dwelling on the aesthetic judgment of monuments in today's cities and territories (**fig. 7**), aims to investigate their intrinsic value to ensure their conservation. In this regard, I have the obligation to summarize the reasons, conceptual contributions, objectives, methodologies, outcomes of our meeting, and the challenges inherent in our scientific activity.

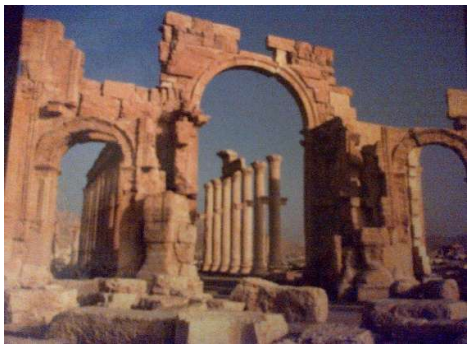

Figure 7

The initiative to form the Group **(fig. 8) was born to elaborate common information and strategies in the context of interdisciplinary research on** monuments exposed to natural and anthropogenic risks.

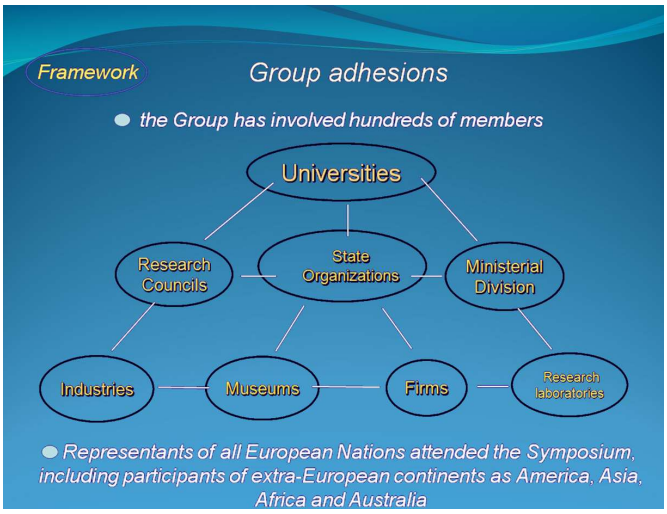

Figure 8

This initiative was linked to a lack of coordination among Mediterranean countries (**fig. 9**), despite their adherence to the UNESCO Convention, which is signed by **a total of 175 countries**.

Figure 9

However, it was favored by the projects launched by the European Commission through the Environment and Environment-Climate programs for the Protection and Conservation of Europe's cultural heritage. These projects **(fig. 10) will lay the foundation for a better understanding of the causes, effects, mechanisms, and consequences of stone decay, and** develop practices and technologies on a sound scientific and technical basis. Until the Group was founded, no one had presented organic proposals that could involve the entire Mediterranean Basin; therefore, the value of the Group lies not only in delving deeper into the issue of monument conservation but also in contributing to the protection and enhancement of the cultural heritage of Mediterranean countries.

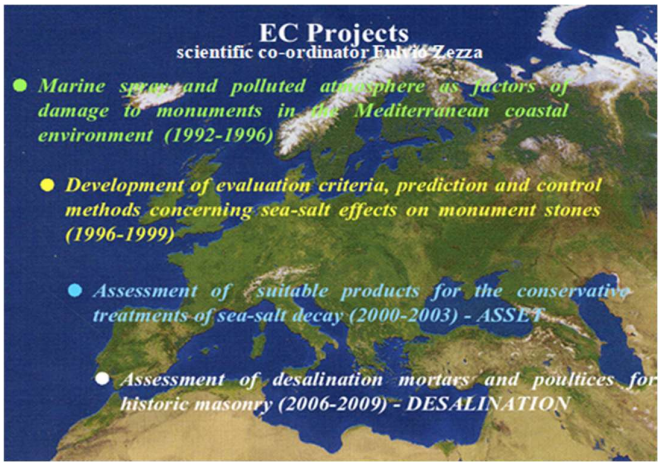

Figure 10

In this context, what conceptual contributions, intervention technologies, symposium outcomes, and challenges does the Group propose?

Regarding the conceptual contributions of scientific research, I often like to emphasize that a monument cannot be summarized in a single stone sample to be analyzed in a laboratory (**fig. 11**), but rather it forms a structure that responds to a series of environmental stresses. According to this perspective, the debate within the International Group aims to develop a synergistic approach focused on a deeper understanding of the damage caused.

Figure 11

Over the last century, a growing trend has damaged a significant number of monuments in increasingly short periods. The architectonic structures, composed of various building materials, react to a wide range of stresses; therefore, stone decay, as well as natural and anthropogenic hazards, proceeds at the same rate and leads to the ruin of the monument.

Among the damage sources are those remarkable for air pollution (**fig. 12**). The great variety of compounds that circulate in the atmosphere enhances stone damage. The accumulation of organic and inorganic pollutants in the air tends to occur on the exposed surfaces of monuments and react with the mineralogical components of their substrates, lacking any form of regeneration.

Figure 12

The industrial development played a significant role in the formation of black crusts (**fig. 13**), which cover and disintegrate the substrates. In particular, the black crusts composed of sulphates (gypsum) are today the most visible consequence of the aggressiveness suffered by the monuments.

Figure 13

Sulphates often act in concert with marine aerosols (**fig. 14**), which are introduced directly into the atmosphere by the sea in the form of drops and minute particles. The salt spray provokes disaggregation, exfoliation, cracking, fissuring, and detachment.

Figure 14

The annual quantity of marine aerosol introduced into the atmosphere by the sea is estimated to be equal to 10^9-10^10 tons/year, so that dry depositions, rainwaters, and those of condensation contribute notably, with the help of sulphates (**fig. 15**), to the deterioration of the monumental patrimony.

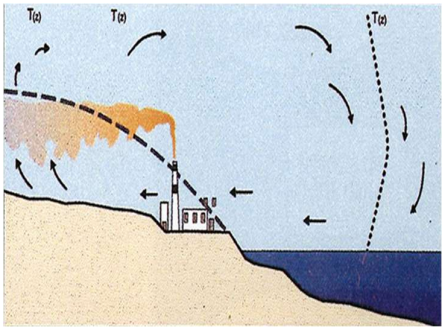

Figure 15

Moreover, the geological risks release the tremendous sight of the catastrophic events that have happened. Seismicity and volcanism, floods and landslides, as well as active tectonic and subsidence, threaten the safety of architectural structures. In monument conservation, the incidence of geological hazards (**fig. 16)** affecting monuments in the Mediterranean region has not yet been adequately addressed. It is also necessary to map the area at risk on both small and large scales. This field requires specialized investigations to forecast the effects of hazards, taking into account the interrelation between the vulnerability of the element at risk and the consequences of expected catastrophic events.

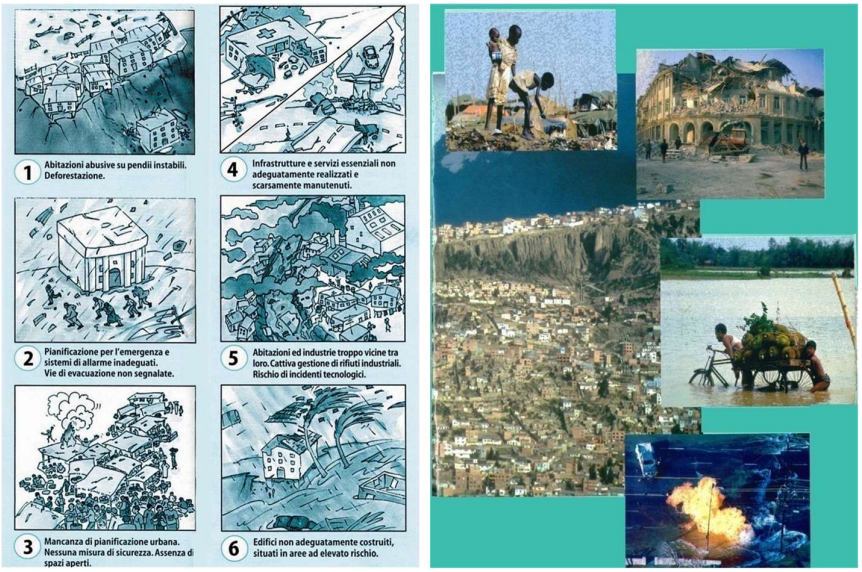

Figure 16

No less harmful are the war events **(fig.17),** which now, as then, spare neither human lives nor monuments. As for intervention technologies, in monument conservation, the risk conditions are a matter of growing concern. In risk management, it is a common task to provide advanced knowledge regarding the three different risk components: damage, vulnerability, and value of the element at risk.

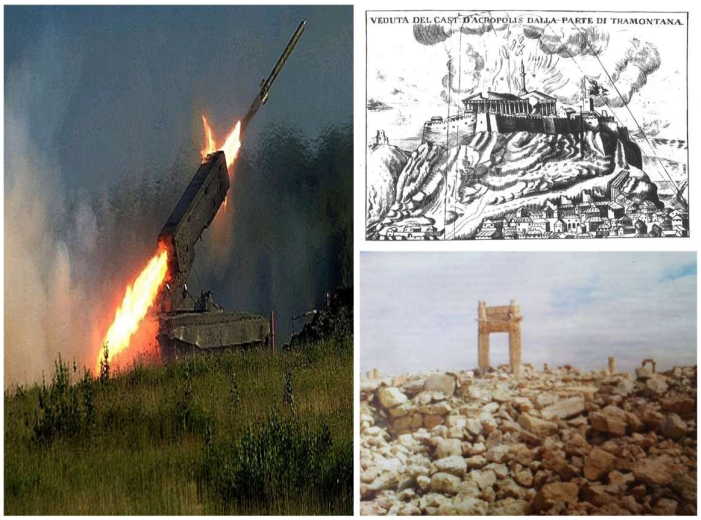

Figure 17

A correct procedure for stone conservation involves three phases of investigation: anamnesis, diagnosis, and therapy. In this way, the International Group intends to provide further findings for mitigating the risks, or rather, reducing the conditions of risk. We share the lines indicated by the European Commission within the Environment and Climate Programme, inspired by objectives aimed at strengthening the scientific basis for protection and rehabilitation measures. Moreover, we dedicate more space to the interrelation between monument and site: the failures are interpreted in terms of the dynamics of the architectonic structure, considered as a whole, and dependent on the intrinsic features and the environment that provoke aggressions of prolonged or sudden action. This approach progresses from understanding causes, mechanisms, and effects to quantifying damage, developing valid methods and technologies for interventions, and ultimately verifying environmental risks.

Besides, taking into account that the preservation of the architectonic structures is of fundamental interest for the economical, social and educational aspects, our efforts are steered towards suitable methodologies as integral part of the damage reduction policy which follow non-invasive analyses **(fig.18)**. The overall aim of the diagnosis is the characterization, quantification, interpretation and rating classification of stone dacay by means non-invasive techniques to assess the degree of damage, the distribution of weathering forms as well as the need of intervention.

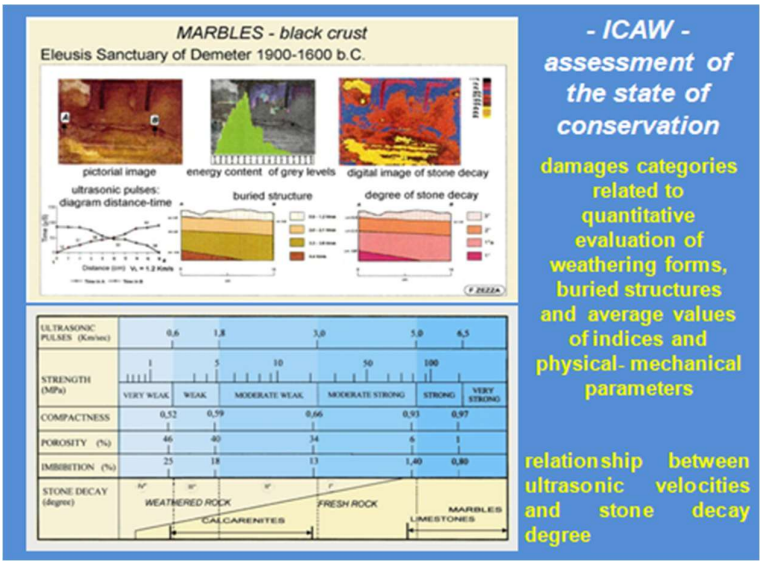

Figure 18

Regarding this, I would like to show you an example of digital images (**fig. 19**) that I processed for the Parthenon West Freeze blocks when I was invited by the head of the Documentation Office of the Acropolis Restoration Service to assess the effects of laser cleaning on marble surfaces before and after treatment.

Figure 19

To protect the materials and consolidate the structures using methods and technologies designed to preserve their artistic value, reducing vulnerability is our target.

As for Symposia outcomes, spreading the knowledge of such enormous richness and contributing to its safeguarding and enhancement has always been the objective of all those who care for the historical and artistic heritage (**fig. 20**).

Figure 20

The examination of the extraordinary cultural heritage of the Mediterranean Basin began with the 11th Bari Symposium (1989), which focused on the coastal environment and, in particular, on the theme of sea-salt-damaged monuments. The 2nd Symposium was organized in Geneva (1992) on the monothematic topic of the white marbles to establish the analytical techniques suitable for tracing back to the ancient quarries and to propose adequate products in conservative treatment. In Venice (1994) and Rhodes (1996), further knowledge was gained on the causes of weathering forms, as well as on the analytical methodologies for conserving monuments and historical complexes. The Symposia of Seville (2000) and Lisbon (2004) addressed the recovery of cultural heritage in cities and territories with environmental conditions. Water and cultural heritage were the themes of the Symposium of Orleans (2007), which began with the monumental patrimony of the Loire Valley. This was a once-in-a-lifetime opportunity to clarify the site's identity in terms of its natural resources, water, and cultural wealth as key elements for the project. Water shapes the territory, and before becoming an economic issue, contributes to the location of historical patrimony, such as abbeys, defense systems, and ancient bridges. Patras (2010), in turn, gives a further opportunity to highlight the focal points of the monument damage hazards and those of the rehabilitation technologies, inside of which are placed equally important topics, from the damage forms to the conservation products, from the test-application to the prevention measures for the monitoring and the maintenance, from the construction to the restoration. In turn, the Symposium of Ankara (2014) focused on integrated rehabilitation methodologies in conservation, stimulating new proposals as answers to the questions that products and conservative interventions must not cause damage to structures and that the performance of rehabilitation works must continue for the structure's lifetime. The Athens Symposium (2017), based on monument hazards and sustainable preservation, aims to

deepen knowledge within the complex system of heritage-environment. Starting from the concept that damaged stone represents one of the most visible aspects of conservation, methodologies and techniques have been examined that are able to contrast or mitigate the occurrence of sudden and long-term events.

As for challengers, the theme of this Symposium, 'Exploring Materials, Techniques and Technological Advances for Conservation, Urban Restoration and Management of Cultural Heritage in the New Era', anticipates the Group's future leadership intentions. The new era is marked by recurring anthropogenic risks, including war and economic crises, as well as environmental changes, alongside impressive technological advancements such as artificial intelligence (AI) within the cultural heritage ecosystem. The theme of the Symposium refers to materials, techniques, and technological advances aimed at sustainable and long-lasting conservation, as well as promoting new approaches in the digital era for cultural heritage management. Within the theme are treated six topics: historical and structural aspects, natural and anthropogenic hazards, damage assessment, digital techniques, technologies for rehabilitation and sustainable preservation, planning, and cultural heritage management. Usually the attention of the speakers is focussed on the two categories into which the monumental heritage is conventionally divided **(fig.21)**: the first includes monument dating from prehistoric age to the fall of Roman Empire, the second includes the heritage ranging from the Middle Age to the Modern Age, such as castles, fortified systems, churces, palaces and historical centres. Each paper presented at the Conference deals with the recognition of the value of the artifact, drawing inspiration from the conservation criteria.

Figure 21

Monument preservation is of fundamental interest for the social, economic, and educational aspects, so that our efforts are steered towards the major conservation requirements that arise from research capable of formulating the compatibility among materials, architectural structures, environment, and management strategies. Spreading awareness of the Mediterranean heritage and contributing to its protection is the

qualifying objective of those who care about the cultural identities of the countries that hold treasures of inestimable value.

I would like to conclude by thanking the Organizing Committee and the Scientific Committee who made it possible to provide the best welcome for the participants and to ensure the selection of communications for the dissemination of the most recent and significant results. I would like to express my appreciation to the participants for their continued contributions to the development of the topics on which our interdisciplinary approach to conservation is based. Convinced that our mission will always be supported by scientific knowledge in facing future challenges, I wish everyone a fruitful job.