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NATURAL HISTORY MUSEUMS: IMPORTANCE IN THE ACADEMIC AND SOCIETY FRAMEWORK, THE REDEMPTION SEARCH FOR THE NEW HORIZONS OF SCIENCE…

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Abstract

Society in general is distant from scientific culture, it is required to bring scientific knowledge closer to the population. In this context, an effective and attractive way for scientific dissemination is the establishment of natural history museums, which are institutions of knowledge, displaying the past. Natural history museums have the natural world as their object of study; and their collections may contain the most diverse types of materials (local and/or from various parts of the world), such as zoological, botanical, geological, archaeological, among others. Scientific collections are the largest and most important source of authoritative biodiversity data, contributing to studies of biodiversity composition, evolutionary (morphological and genetic), biogeographical, phenological, as well as geological. The materials present in these collections may serve for temporal comparison, being useful to produce predictive models. Likewise, they have a fundamental role in safeguarding type specimens, i.e. the first organisms identified to describe and name a new species. In addition, there is the component available to visitors in general, in order to raise public awareness on the preservation of the local fauna and flora and of other places in the world. In this way, the museums serve both the academic-scientific public and visitors who come to these sites for recreational purposes. It is intended to promote, in Vila Nova de Cerveira, the Natural History Museum of the Iberian Peninsula - NatMIP ("Museu de História Natural da Península Ibérica"), which intends to collect materials for scientific purposes, mainly Iberian.

Keywords: Scientific collections. Citizen Science. Natural Sciences. Science communication. NatMIP.

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1 Introduction

Society in general is distant from scientific culture, which often occurs due to the lack of articulation of the scientific community and society, which represent inexorably linked subjects. It is clear the need to bring scientific knowledge closer to the population (DELICADO, 2006). In this context, an effective and attractive way for scientific dissemination is the establishment of natural history museums, which are knowledge institutions, exposing the past as an object of study (JOHANSON; OLSEN, 2010).

Natural history museums have the natural world as their object of study; and their collections may contain the most diverse types of materials (local and/or from various parts of the world): zoological (such as insects, mammals, reptiles), botanical (plants), paleontological (fossils), geological (minerals and rocks), archaeological (artefacts and objects from early human civilisations), ethnographical (materials produced by more recent civilisations), artistical (artistic materials that reflect culture), among others. These institutions originated in European Renaissance and Enlightenment, most notably the "Muséum National d'Histoire Naturelle" in Paris, the British Museum in London, and the Ashmolean Museum in Oxford-England (ENCYCLOPÆDIA BRITANNICA, 2021).

Natural history collections are the largest and most important source of authoritative biodiversity data, contributing to studies of biodiversity composition, evolutionary (morphological and genetic), biogeographical, phenological, as well as geological. The materials present in these collections can serve for temporal comparison, being useful to produce predictive models. Furthermore, they have a fundamental role in safeguarding type specimens, i.e., the first organisms identified to describe and name a new species. In the specific case of biological samples, these also serve for genetic, biochemical, isotopic and trace element studies on the responses of organisms to environmental changes (LISTER; CLIMATE CHANGE RESEARCH GROUP, 2011).

Basically, natural history museums present two main parts: a) the scientific collections, which are managed by researchers, who are specialized in organizing, systematizing and identifying the species to be kept, and there may be a posteriori exchanges of material between other international museums; b) and the part available to visitors in general, with the purpose of raising public awareness in the preservation of local fauna and flora, and the title of knowledge of biota from other places in the world.

In this way, museums cater both to the academic-scientific public and to visitors who come to these sites for recreational purposes.

In the scientific field, museums are essential, from the description of new species, involving also the evaluation of climate change impacts on biota conservation, as well as the study of the relationship between host species and pathogens, among other aspects, museums have an essential role in understanding these types of phenomena (CERÍACO; ALMEIDA, 2020), with long-term storage of organisms.

Thus, the aim of this study is to demonstrate the importance of natural history museums for basic science, and the re-establishment for the new science horizons.

2 Material and Methods

Through research background, manuscripts were sought through semi-systematic literature review (SNYDER, 2019), using secondary research, i.e. data already published in journals, books, internet sites, among others (NCU LIBRARY, 2021).

3 Results and Discussion

3.1 Global climate changes

Climate change, as indirect phenomena resulting from human action, has been associated with a number of negative effects on the environment, for example the increase in the amount of carbon dioxide in the atmosphere (ZIEHN et al., 2011), ocean acidification (KOCH et al., 2013), increasing average water temperatures (KARVONEN et al., 2010), loss of habitats (MANTYKA-PRINGLE; MARTIN; RHODES, 2012), melting of the polar ice caps (BARNES; KAISER, 2007), or changes in organism assemblages such as fish (LYNCH et al., 2016).

Currently, the planet Earth is experiencing a moment considered as the "sixth mass extinction" of species, being intensified significantly by anthropogenic action (CEBALLOS et al., 2015). There is, for these reasons, interest in keeping track of the existence of species that still exist, many of which are disappearing, and it is essential to build a long-term database, which will allow monitoring studies, as well as definition of actions to minimize anthropogenic effects.

3.2 Environmental education

Within the scope of environmental education, museums are appropriate places for displaying material to the public, with the aim of raising people's awareness of the preservation of biodiversity, as well as the conservation of public heritage (BAMBERGER; TAL, 2009; RODRÍGUEZ; CAMPOS, 2021).

In modern days, museums contribute more to environmental education beyond public collections and indoor activities. In this way, citizen science may benefit both sides, in which one provides relevant contemporary data and material to the museum's knowledge (SIMPSON, 2003), the other integrates the community in research projects from which they benefit in the end. Thus, we have a reciprocal relationship and a better insight of the environment.

In common sense, people have an outdated view of museums, in which the dominant role is that they are a place to store "old things" and are only important for older people. Nonetheless, the current challenge is to reinvigorate these research sites to serve to raise people's awareness, using practical tools in environmental education.

From museums also derivates knowledge present in diverse communication media (e.g., documentaries, workshops, seminars) in areas not only relevant to biologic sciences as but also relevant to humanistic heritage. By targeting young population museums contributes to the formation of individuals sensitive to emerging polemics not so evident in previous generations.

It is essential apply educational programs aimed at research interest in museums for encouraging students (SIMPSON, 2003) and to keep alive for future generations the importance and benefits of these institutions for society. To awaken students to the importance of scientific collections can be done using real pieces and replicas of these, in which they must identify the authenticity of the museum pieces (LAND-ZANDSTRA, 2021).

3.3 The Iberian Peninsula and the Minho River

The Iberian Peninsula is in the southwest of Europe, occupied by Portugal and Spain, and is geographically delimited by the Pyrenees Mountain range, separating it from the rest of Europe. In the south, at Gibraltar, the peninsula is separated from North Africa by the Strait of Gibraltar. To the north, west and southwest it is washed by the Atlantic Ocean, to the south and east by the Mediterranean Sea (ENCYCLOPÆDIA BRITANNICA, 2021).

The Peninsular regions are favourable sites for the phenomenon of species isolation, promoting endemism. In Europe the Iberian Peninsula stands out, possessing a part of the biota distinct from other areas, as a result of the effect of the Pleistocene glaciations (ABELLÁN; SVENNING, 2014), which caused the formation of the Pyrenees mountain range (PALLÀS et al., 2006) and allowed the existence of great temperate refugia on the south Peninsula region, besides environmental conditions, including short-term and high-amplitude climatic fluctuation at Upper Pleistocene (TABERLET et al., 1998).

During glacial and interglacial Pleistocene periods, constant climatic oscillations were a reality, constraining and expanding the species ranges through all the Europe (TABERLET et al., 1998), due to the expansion and retraction of the Scandinavian ice sheet (HEWITT, 1996). As the interglacial age occurs, more continental habitat becomes suitable for the expansion of south peninsular species, however the continental mountain ranges suit a geographic barrier for the normal gene flow. As Hewitt hypothesis that geological ranges like Pyrenees and Caucasus are hybrid zones for parapatric speciation, being a semipermeable zone for the haplotypes flow, allowing a bottleneck phenomena to occur during the climatic oscillations (HEWITT, 1996). As Hewitt hypothesis that geological ranges like Pyrenees and Caucasus are hybrid zones for parapatric speciation, being a semipermeable zone for the haplotypes flow, allowing bottleneck phenomena to occur during the climatic oscillations (HEWITT, 1996). As a result, haplotype diversity is bigger in Iberian, Italian and Greece peninsulas than the north and central Europe. Furthermore, its geographical position and high geo-physiological complexity, with several mountain ranges and main rivers having an east-west orientation, allowed the formation of a heterogeneous matrix of biotas (alpine, coastal, Mediterranean, temperate, etc.), leading largely to the endemic species hotspot that Iberian Peninsula is today (GÓMEZ et al., 2007; ABELLÁN; SVENNING, 2014).

3.4 Natural History Museum of the Iberian Peninsula (NatMIP)

The Natural History Museum of the Iberian Peninsula - NatMIP ("Museu de História Natural da Península Ibérica") intends to contribute to the conservation and dissemination of aquatic and terrestrial biota, with particular emphasis on Iberian ecosystems, as well as paleontological, geological, archaeological, and ethnographic material. The name NatMIP thus refers to its location as a reference structure for Iberian natural heritage.

NatMIP will include a collection of scientific collections of global interest, which will be achieved through partnerships and heritage exchanges with other institutions. Besides this, there will be a strong component of Science communication and dissemination, so it will have a space dedicated to exhibitions open to the public. NatMIP will also have a research support component, with research lines that include biodiversity, geology, archaeology, among others.

The project is interconnected with the Aquamuseu do Rio Minho, within the Portuguese historical-cultural heritage and biodiversity. Likewise, it will be part of the structures managed by the Municipality of Vila Nova de Cerveira. This museum aims to create a scientific institution of reference in the northern region of Portugal, establishing

partnerships/co-participations with entities from neighbouring territories, and to contribute to the technical and scientific development, which will be relevant for scientific culture, preservation awareness, as well as building a biological, geological, archaeological, national, and international collection.

4 Conclusions

There is a challenge for recent scientists to maintain and develop more natural history museums around the world, and to awaken this feeling in younger people, looking at Citizen Science as a parameter for this goal. Thus, museums should always be modifying themselves facing the changes and modernities of current world, as well as always thinking ahead of their time, using technology to their advantage. Moreover, using the foundations of Environmental Education, museums can also serve as a tool to raise awareness about endangered species, for example, and the effects of climate change on biodiversity. In the cultural sphere, the social pieces show our anthropogenic evolution, with pieces and tools of useful use throughout our history, and thus preserve the heritage produced by ourselves over past generations.

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