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Enhancing the educational value of palaeontological heritage: the didactic collection of the Museu de Ciències Naturals de Barcelona (Catalonia, Spain) and its strategic framework.

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Abstract

The biased perception society has towards palaeontology, shown through practical activities experience, has led a multidisciplinary team of educators and scientists to meticulously design a didactic programme to increase, in a regulated and coordinated way, the outreach of this science at the Museu de Ciències Naturals de Barcelona (MCNB). The specific objective of the programme, which can be summarized as to strengthen and diversify the educational offer of the MCNB concerning palaeontological topics, serves as a cohesive and comprehensive channel to achieve the strategic aim of communicating effectively the importance of palaeontology as a science and increasing social sensibility towards conservation of the palaeontological heritage. In this context, establishing a strategic framework as precise guidelines for the didactic programme in palaeontology seems necessary to improve and guarantee its sustainability over time. The didactic collection is a key resource for the complex inner workings of the programme, not only to communicate main palaeontological principles aimed to be addressed, but also as a tool to disseminate the significance of the work carried out at the museum. Overall, the programme is conceived as a model in palaeontological didactics, and additionally, as an interdepartmental collaboration to subsequentially develop activities and projects to promote and strengthen the understanding of palaeontological science and its role within society.

Keywords

Didactic collection, Palaeontological heritage, Palaeontology, Geology, Education

Declaration

Not applicable

I. **Introduction**

Palaeontology has experienced a mass mediatic take-off over the years, due especially to films and major documentaries, and now being perceived as a popular science among society. However, what is actually known about palaeontology? Is its role valued by citizens? Is there enough outreach taking place by museums and similar institutions?

Despite its popularity, palaeontology remains, in general terms and from our own outreach programme experience, as a relatively unknown discipline for society. Its outreach usually concerns few topics, such as dinosaurs and the origin of humans, giving an incomplete perception of its scientific role – even being mistaken for other related disciplines, such as archaeology – nor its social relevance. Furthermore, the scientific relevance of palaeontology is not sufficiently enhanced by formal Education either, considering the few contents related to geology and, in particular, to palaeontology, in the Spanish Educational Laws since 1970 (Ozkaya de Juanas and Barroso-Barcenilla, 2019). These facts have contributed to palaeontology being perceived in a mistaken and unfortunate way, and despite its popularity, as a science with little practical relevance for social progress.

In this scenario, it has been and still is fundamental to multiply effort in order to increase the public's sensitivity towards palaeontology. Historically, public institutions, particularly in Spain, have had a discontinued commitment when supporting and reinforcing this science in all its scopes (Perejón 2001). Concerning the outreach field, during the 19th century and early 20th century, great projects were developed, aiming towards the dissemination of geology and palaeontology to a diverse public. These projects were driven by outstanding palaeontologists of the age, as it was a time of considerable scientific production (Sequeiros 1982). The national project for the creation of a didactic collection for public educational centres, carried out by the "Comisión del Mapa Geológico de España" (Commission of the Geological Map of Spain) during the 19th century and a large extent of the following century deserves a special consideration for its ambition and scope (Lozano and Rábano 2001, 2004; Sanz-Pérez et al. 2017, Rábano et al. 2020). Currently, there are many museums and science centres with didactic collections and other resources to teach and disseminate palaeontology.

Currently, there are innumerable initiatives, undertaking a more practical approach, which are being developed by many international institutions in order to continue popularizing palaeontology and provide it with a transversal point of view. For example, digital resources have been created, such as the website "PopPalaeo.com", developed by King's College London (Manias 2018), along with other outreach initiatives carried out by palaeontological societies from different countries, such as the FOSSIL project in the United States (MacFadenn et al. 2016).Other European countries have presented at a curricular level, content concerning palaeontology, and Natural Sciences in general, such as Portugal, where special attention is paid to out-of-school activities (e.g., Orion 2001) or Greece, where didactic proposals about the palaeontological content of the country have been put forward (e.g., Fragouli and Rokka 2017). Additionally, in Spain, regarding facilitated-led activities, the use of palaeontological topics for activities and workshops has increased in the past decades at all educational levels (Arenillas et al. 2000; Rábano and Rodrigo 2001; Rodríguez and Durán 2001; Calonge García et al. 2003; Rodrigo Sanz et al. 2008; Ruiz et al. 2009; Alcalá et al. 2010; Fernández-Martínez et al. 2016, among others).

Natural History and Natural Science museums are erected as the perfect context to develop such didactic activities and create the appropriate resources, which are aimed to complete the museum experience. The diverse and abundant activities, workshops and didactic collections related to palaeontology in museums or other science centres are often public and accessible through journal papers (see above) or institutional websites. However, the complete strategic educational programmes in which they are included are not usually public. In the vast majority of cases these programmes consist of a set of activities and many other teaching resources. Museums are key in this scenario, sharing their expertise in pedagogy in a complete and comprehensive way, and defining their educational guidelines through the use of real objects. From this perspective, not only facing "real" objects seems to be one of the multiple attractions of museums, but also the authenticity of these real objects seems to be valued by the public (Schwan and Dutz, 2020). By extension, the role played by museum educators is crucial to engage visitors in the museum experience (see studies of Tran, 2006, Tran and King, 2007, Pattison and Dierking, 2013, Shaby et al. 2018). The main point of educators in a museum is helping visitors; consequently it is essential to "help the helpers" (Schauble et al. 2002) through appropriate mechanisms. From our point of view, defining and sharing the strategic guidelines of the didactic

programmes are key to achieving this goal and to create a synergy to learn from the experience of others.

Is in this context in which the Department of Palaeontology and the Department of Education and Activities of the Museu de Ciències Naturals de Barcelona (MCNB) aimed to develop a detailed educational program in palaeontology based on the current general didactic model of the museum (Banqué et al. 2013). The first decision made in 2017 was to start to increase and diversify in the upcoming years the educational activities related to palaeontology. However, during the design of the activities, several essential questions which needed precise answers emerged among the team members, such as, what kind of activities would we like to carry out? Which is our target public? What do we want to explain and teach to visitors? These questions raised the necessity to elaborate a specific didactic programme about palaeontology, from which the rest of specific projects, including activities, emerge (Fig. 1). So far, only sporadic outreach activities on specific dates were carried out (e.g. during the European Science Week or open days). The ambition of the programme is not only to provide an assemblage of resources to carry out activities, but also to hold a series of steps to define their use and management in order to reinforce its structure and durability. The constitution of all the didactic resources available as a true collection for this programme, raising its value as a complementary tool to the permanent exposition of the MCNB, is one of the most important steps towards the diversification and consolidation of any type of educational activity.

The didactic programme of palaeontology aims to be a reference set of instructions which gathers strategic objectives, theoretical background, needed resources, organizational and functional aspects, and feedback approaches. All of it to establish the guidelines for the didactic model for palaeontological science and, ultimately, to share a useful tool to museum educators. From here on, activities and workshops will be included in this strategic framework, some of these activities are already active, and others are still in development, all of them created as individualized projects to facilitate their evaluation.

II. Strategic context

The current strategic plan of the MCNB establishes as a priority that the purpose of the museum is to be an educational model centre concerning the natural world. There are two established programmes which are being developed aiming to accomplish this strategic priority; firstly through the permanent and temporary exhibitions and, on the other hand, through high-quality public activities and workshops. The latter have been based on an ambitious objective: the definition of an own didactic model which pays special attention to inclusion.

The opening, in 2011, of a new public centre of the MCNB at the Fòrum park, allowed the Department of Education and Activities to develop, along with the "Còmplex" research team from the Department of Didactics of Mathematics and Experimental Sciences from the Universitat Autònoma de Barcelona, a didactic model in which the activities are the result of a dialogue between learning content, the educational team, the context and visitors. The new model sets value to contextualized real objects and phenomena. Activities should connect scientific knowledge and practical activity: manipulating real objects favours reflection and the acquisition of new knowledge (Banqué et al. 2013). Therefore, real objects were deemed to be essential in all the school activities that the Department of Education and Activities designed for the new centre such as the "Niu de Ciència" (Science Nest), a space for children from 0 to 6 years old to take part in school and family activities (Pedreira 2015).

In parallel and in harmony with the didactic model, the museum philosophy understands inclusion as a global concept inspired by values of accessibility, proximity and equity, in order to reach everyone and contribute to social development, fighting against exclusion (Ballester et al. 2014). Due to its nature, the inclusion programme of the museum has a transversal focus which affects all departments, requiring a gradual implementation: each proposal is developed and strengthened, adding it to the previous measures, creating a thicker web of small and large actions. In this framework, different initiatives of citizen participation have been carried out, such as "El Consell d'Infants del Museu" (The Children´s Council of the Museum). Simultaneously, other educational projects have been designed to be portable, extending the learning experience to different audiences: the "Museu Ambulant" (The Ambulant Museum) brings natural heritage to penitentiary centres, the "Niu Volant" (Flying Nest) to nursery schools and the "Nat Viatger" (Nat Traveller) to hospital classrooms. All these projects share a same necessity: to teach and motivate visitors about Natural Sciences through the given resources at the

museum which are real objects. It is from this need that the MCNB started to constitute, and strengthen, the didactic collections used by different Natural Science disciplines.

The former assemblage of objects with didactic purposes in the MCNB, not considered a true collection, included original material that was derived by the curators, who selected material not suitable of being registered in the official collection.

Over the years, the educational offer of the museum has increased, a fact that has prompted the demand for more and more didactic resources. The absence of a defined directional plan or project for these materials has led them to be unstructured, making their use by the educational team of the MCNB difficult. In general terms, managing natural history collections is complex due to their heterogeneity and their volume regarding number of specimens. The larger the collection, the greater the challenge for its management and adequate use. Without a clear and organized model, the palaeontological didactic resources was adopting a chaotic style over time. Standardizing the use of this material and transforming it as a true collection were the main objectives of the programme presented in the present paper. The main objectives stablished are reordering the specimens, systematizing its growth and improving its management, with the subsequent aim to strengthen its value as a didactic tool.

As a starting point, the idea of formalizing the didactic collection called to be based on strategic objectives to increase its use in order to become one of the key projects of the museum. The main challenge came from the need to have a clear structure to relate the objectives to the collection, the stories wanted to share, the communities implicated in the learning-teaching process, the experience of the museum in its different fields, and the public. In this way the following strategic objectives were defined:

1. **To promote the basic principles and values of palaeontology and its social impact.**

Nowadays, claiming the importance of palaeontology as a science, and implicitly, of palaeontological heritage, is becoming more and more common, not only as a response to the need to complement knowledge about our natural environment to understand it as a product of millions of years of evolution, but also as a source for learning to forecast the future of ecosystems and the consequences of human

action upon our planet. In parallel, and as a direct product of these necessities, the protection and conservation of palaeontological heritage, both movable and immovable, has gained importance. In this way, the didactic proposals and the related activities become an allied tool to transmit the importance of this science and the obligation of conserving heritage for future generations.

2. **To show the scientific and technical activity of the museum**.

Which is our mission as a museum? Why do we keep collections? What kind of material do we conserve? How much work is behind preserving fossils for future generations? These are only a few questions which many visitors ask the technicians and scientists working at the museum. Even though some of them could be answered in general terms, valid for other natural science museums, at an institutional level it seems interesting for citizens to know about the specific programmes of the MCNB, and its role in a national and international outlook.

Amongst the main objectives, it is essential to explain how historically the palaeontological collections of the MCNB have helped to progress in the geology and palaeontology of Catalonia (Masriera 2006) and, implicitly, of Spain. In this strategic objective, it is also important to enhance the activity of the technical-scientific infrastructures at MCNB, which are the laboratories for preparation, conservation and restoration. Likewise, other issues related to research and practical work carried out by the Department of Palaeontology are of interest to consider when increasing the number of specimens of the didactic collection and when designing the activities for visitors.

3. **To maintain coherence within the educational guidelines of the museum.**

The strategic objective of the MCNB of becoming a model museum concerning education and contributing efficiently to generating knowledge and to environmental conservation matters, has led to the need to broaden, diversify and consolidate its audience. To achieve this, it is essential to clearly define an educational model including the main guidelines to be followed. One of these guidelines is the use of real objects during the activities, raising awareness about the museum heritage. It is essential to select which items of the collection meet the adequate parameters to fulfil the stablished objectives by both, the educational programme of the museum and those of the teaching community, adopting the

perspective of the teacher (DeWitt and Osborne, 2007) in order to offering a unique complementary for schools. The activities should prompt a constant dialogue between the contents of the activity and the museum's collections, along with the classroom where workshops are carried out and the exhibition where the real objects can be found.

The MCNB is a scientific centre where managing the collection and researching generates a constant flow of knowledge, which allows it to quickly develop didactic programmes adapted to different educational levels and groups, with the aim of achieving significant learning outcomes (*sensu* Ausubel, 1968) among the visitors, and consequently, fulfilling the proposed strategic objective.

4. **Enhance collaboration between the scientific departments and the Department of Education and Activities.**

The staff ascribed to scientific departments of the MCNB maintain sporadic collaboration related to Natural Science outreach carried out by the Department of Education and Activities. For example, activities such as "Visita el Museo de la mano del conservador/a" (Visit the Museum with the curator), which has been ongoing since 2015, with a strong interest from the public, allow visitors to meet members of the scientific teams and learn about the work they carry out at the museum. During this experience collaboration is essential, the supporting role of the educational team acts as the interfacebetween scientists and visitors, helping to develop a satisfactory learning experience for all. In this setting, the interaction among visitors, scientists, educators and real objects, in this case, fossils, is also fundamental for the experience be successful with the public.

Bearing in mind these and other previous experiences, not only has the museum decided as a strategic objective to continue with interdepartmental collaboration, following the current educational planning (Table 1), but also, to increase it by means of new workshops related to palaeontology. The design of these new activities are currently in progress and will be incorporated to the didactic programme in palaeontology presented here.

The role of laboratories at the MCNB as high performance technical-scientific facilities should also be shown to visitors. In this case, the Laboratory of Geological and Palaeontological Preparation and the

Laboratory of Preventive Conservation and Restoration assume an outstanding role when providing items to illustrate relevant tasks that are specified in the section "Resources".

Reinforcing collaboration among the relevant departments has also had an internal application. The programme for the didactic collection of palaeontology led to the implementation of an associated brief training project, in which the technicians of the Department of Palaeontology were in charge of updating some specific concepts of the science through internal seminars.

III. Theoretical framework

Defining the objectives and contents to be achieved is a priority in order to design the didactic proposals. The learning objectives specify what the MCNB, through activities, hopes to be achieved by visitors.

This theoretical background has been mainly defined considering the most relevant aspects in palaeontology and geology at an elementary level, taking into account the current regulations for which the Spanish Educational Curriculum is designed. Such is the case of the education law "Ley Orgánica 8/2013, de 9 de diciembre, para la Mejora de Calidad Educativa". Additionally, other principles such as those related with natural heritage management are especially important, giving a holistic approach of nature conservation through a transdisciplinary point of view connecting geology, palaeontology and biology (Henriques and Pena dos Reis, 2015). In order to communicate efficiently all these theoretical principles, a series of general objectives (Table 2) and concepts (Table 3) have been stablished to be undertaken.

As each individual project consists of its own specific objectives, contents and methodologies, each didactic proposal should be based upon a different Didactic Model for the teaching-learning of Natural Science (e.g., Vílchez-González 2014), in order to cover a diversity of learning strategies. Alternatively, through a more practical context and with the aim of being adapted to the educational guidelines of the MCNB, the museum's didactic model developed by Banqué et al. 2013 can also be used.

Furthermore, the process of didactic transposition plays an essential role in adapting the theoretical framework to the relevant audience. Children and families will be especially considered, as well as managing diversity.

IV. The didactic collection of palaeontology

Resources: content of the collection

From a functional point of view, it is imperative to categorize the elements which make up a certain collection, as each typology has its own specifications concerning use, conservation and storage. The palaeontological didactic collection includes the following type of items: fossils, fossil replicas, preparation and conservation supplies, graphic and multimedia resources. Regarding the two first types of items, the selection has considered the classification scheme for fossil specimens given by Page (2004), being all the categories defined there represented in the collection. Presently, the number of fossils and replicas comes to a total of 77 registered units and 258 specimens and continues to expand.

Fossils. The fossils which compose the collection must be in optimal conservation conditions to ensure their integrity and durability, as they will be subject to constant handling. The items selected are key specimens of stratigraphical or palaeobiological significance and common and representative species (categories 3 and 4 of Page, 2004). The followed criteria to complete the collection should obey the principle of maximum diversity, amongst the available resources, both from a taxonomic and geological age points of view (Fig.2 and Fig. 3). When selecting specimens, their versatility for transmitting the proposed theoretical framework of the educational programme should also be considered.

Fossil replicas. The implementation of the project includes the elaboration of replicas of representative fossils, such as types or specimens of fundamental importance (categories 1 and 2 of Page, 2004) (Fig. 4), as well as other relevant pieces and items for supporting the outreach activities. This part of the collection is especially important in activities and workshops designed to communicate the specific value of the palaeontological heritage housed in the museum. Computer reconstructions and 3D printings are also being considered to be included in the collections, as they help to complete the museum experience and to further entice visitors (Rahman et al. 2012, Wilson et al. 2017).

Preparation and conservation supplies. Aiming to complement fossil related items, originals and replicas, and to disseminate the technical-scientific work carried out at the museums specialized laboratories, palaeontological preparation and conservation supplies are included to the collection (Fig.5). In this way, the complex field of specimen preparation and conservation can be brought closer to visitors, by presenting some examples of the processes undertaken at the laboratories. In this section all tools which can be considered suitable for demonstrating the tasks developed during fieldwork, such as hand lenses, geological hammer etc. are also included.

Graphic and multimedia resources. The programme for the palaeontological didactic collection also includes multimedia resources, such as photographs, digital presentations (slides), reference publications etc. intended to complement the educational activities. This type of resources can acquire a remarkable role when such activity is developed indoors, in classrooms adapted with technological devices. The way how this material is used will depend on both, the activity itself and the facilities in which it is carried out.

Organization and functioning

The didactic collection of palaeontology's main mission is to serve as a highly active and dynamic item, in constant movement, adapting to the needs of the educational activities programmed at the facilities of the MCNB. For this reason, and for its own endurance, it is indispensable that the main programme's framework to precisely develop the most relevant operative aspects.

Staff in charge. To maintain the collection's integrity and effective management, a double responsibility has been stipulated. A technician from the Department of Education and Activities, who is in charge of locating and organizing the supplies after each use; and a technician from the Department of Palaeontology, who is responsible for selecting specimens and other didactic resources. Both are in charge of updating the information included in the database.

***Manipulation and computer management of the collection*.** It is of vital importance for the collection to have a storage facility, as this facilitates its management and avoids misplacing supplies. The Department of Education and Activities has an exclusive locker at their storage facility in which the collection will be kept, following conservation standards.

Likewise, computer management by the staff in charge is also a key factor for success and stability, for both the collection and didactic programme. It is as important to withhold the specimens at an assigned place, as it is to keep updated a simple database with the basic fields for its adequate use. Far from the complex databases required for the standard museum collection management, the one for the didactic collection is designed to be simple and flexible for a quick visualization of the information associated to each specimen (Table 4). Currently, the information is stored in a simple table, however, it is projected to be incorporated to the digital platform of PangeaDB®, programme used for the MCNB collections management (Roquet et al. 2019).

An inventory number is also assigned to each one of the specimens and supplies to facilitate its location, they are also photographed to create a graphic catalogue where the whole collection may be visualized at a glance.

V. Evaluation

In order to improve and adapt the teaching-learning process to the interests and needs of the public, resources for gathering feedback play an important role in education (e.g., Wiggins 1998; Higgins et al. 2001; Huxham 2007). Scientists have not always the appropriate teaching training to be aware of how to transmit a concept in a meaningful way, making feedback a basic tool to know if they are achieving set objectives. These approaches for gathering feedback should ideally be designed individually for each activity, as the users of the didactic collections and the participants of the workshops are those who provide the information through different means, such as questionnaires or surveys. Once this information is gathered, a proposal to improve and adapt projects should be developed, covering needs and requirements of the didactic proposals (Hattie, 2012).

VI. Conclusions

The didactic programme of palaeontology of the Museu de Ciències Naturals de Barcelona is designed as an innovative reference project for educational department of Natural Science museums. The programme has not been only designed to arrange a series of didactic supplies to constitute an isolated collection, it also establishes palaeontological theoretical fundamental in order to guarantee its sustainability and endurability over time. The didactic collection of palaeontology is innovative as it meets the purposes of an established didactic programme, being created in collaboration between educators and scientists. The programme constitutes a functional framework to design activities as individual projects. These educational activities concerning palaeontology, some of them already implemented, others still at a design stage, will be incorporated into the educational model of the museum.

The didactic programme of palaeontology of the MCNB, as it is defined in the present paper, is potentially exportable to any other museum with similar strategic aims and objectives. The process of adapting this programme to the specificities of other institutions might result in a feedback of the different experiences in its implementation for any prospective improvements. In the end, the common

and ultimate strategic objective is to increase citizens' sensibility towards palaeontology, and implicitly, strengthen this science to be seen as a discipline with a strong sociocultural value for the world we live in.

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ACTIVITY	DESCRIPTION	PERIODICITY	PUBLIC	NUMBER OF PARTICIPANTS (per session)
Visita el museo de la mano del conservador/a (Visit the museum with the curator)	Guided visits and workshops by the scientific team of the museum	Monthly	Families with children over 10	20
Niu de Ciència (The Science Nest)	Exploration environment for children between 0 and 6 years old.	Daily	Families with children under 6	20
El Club dels llunàtics i llunàtiques (Lunar Club)	Scientific seminars of small scale. Activity inspired on the sessions of the Lunar Society of Birmingham (S. XVIII-XIX).	Monthly	General	30
Congrés del Patchwork Evolutiu **(Secondary School Congress on Evolution)**	Educational activity for secondary school about the Theory of Evolution.	Annual	School groups	160

Projectes educatius en col·laboració (Collaborative educational projects)	Scientific congress co-designed with school centres.	Annual	School groups	125
inNat	Guided visits to the scientific laboratories and collections.	Monthly	General	20
inMuseu – Visita l'interior dels museus (In the museum – guided visit inside the museum)	Guided visits to the scientific laboratories and collections.	Annual	General	260

Table 1. Current educational offer of the Museu de Ciències Naturals de Barcelona (MCNB) concerning the activities carried out in collaboration with the Department of Education and Activities and the scientific departments (Palaeontology, Mineralogy, Petrology, Arthropods, Non Arthropods Invertebrates, Vertebrates, Botanic and Sound Archive), with the main objective of outreaching the technical and scientific work beyond the permanent exhibition.

General objectives
1. Transmit general concepts about fossils and the geological time
2. Promote the bond between geology and palaeontology as their social relevance
3. Present the palaeontological scientific work
4. Raise awareness of palaeontological heritage and take action for its conservation
5. Develop critical thinking by observation as the base for the scientific method
6. Show the different functional duties of the MCNB and their role in palaeontological heritage outreach

Table 2. General objectives defined as the reference framework for the planning of the didactic programme and the subsequent projects of the Museu de Ciències Naturals de Barcelona (MCNB) in palaeontology.

CONTENTS
General palaeontology
- Geological record
- The Earth's magnetic field
- Geological time: human scale and geological scale
- Tectonic plates and landscape changes
- Geodiversity and palaeobiodiversity
- Fossilization
- Evolution

- Dating fossils
- Index fossils and “living fossils”
- Extinctions and biological crisis
- Palaeoclimatic changes and biomarker organisms
Technical-scientific work
- Excavation, collection, preparation and restoration
- Heritage and conservation: the importance of fossils in cultural management
- Geological cartography: socio-economic applications
- Geology, palaeontology and industry: ornamental and building fossiliferous rocks

Table 3. Contents of the educational project of the Museu de Ciències Naturals de Barcelona (MCNB) related to the objectives from Table 1.

ITEMS	DESCRIPTION
Acronym and inventory number	Alphanumeric field with an acronym, to distinguish the palaeontological didactic collection from the other collections, and an inventory number for each specimen or lot
Number	Number of specimens (when lots or sets)
Scientific name	Scientific name as precise as possible. If specific it should be binominal
Common name	Epithet or common name which identifies the taxon, beyond its scientific name
Age	Geological age of the specimen, as precise as possible
Locality	Geographic information of the outcrop of origin
Date of entry	Date in which the specimen accessed the didactic collection
Photograph	It is indicated if the specimen has already been photographed
Objectives	General objectives and contents associated with the specimen
Activities	Programmed activities in which the specimen is required
Location	Physical location of the specimen
Observations	Comments related to the possibilities of use of the specimen
Record	Other aspects to document: as place of origin of the specimen, donors, etc.

Table 4. Fields included in the database of the didactic collection of palaeontology of the Museu de Ciències Naturals de Barcelona (MCNB).

Figure captions

Fig. 1. Consecutive phases and activities included in the didactic programme in palaeontology of the Museu de Ciències Naturals de Barcelona (MCNB). Each workshop or activity is an individualized project which is implemented with previous plans, designs and evaluation considering the set objectives. The didactic collection is constituted as an optional resource to enrich different specific educational projects (workshops or other activities).

Fig. 2. Total number of the specimens included in the palaeontological didactic collection of the Museu de Ciències Naturals de Barcelona (MCNB), distributed as **a** taxonomic groups; **b** proportion of fossils and replicas; **c** Periods of the geological time scale.

Fig. 3. Fossils selected for the palaeontological didactic collection of the Museu de Ciències Naturals de Barcelona (MCNB); **a** echinoderms of the genus *Micraster*, ACT-PAL 71; **b** scleractinian coral, ACT-PAL 32; **c** fossilized fern Pteridospermae, ACT-PAL 47; **d** brachiopods of the group Spiriferinida , ACT-PAL 60; **e** rudist bivalve of the genus *Hippurites,* ACT-PAL ; **f** variety of gastropods, ACT-PAL 14. Graphic scale: 2cm.

Fig. 4. Selection of fossil replicas included in the scientific collections of palaeontology of the Museu de Ciències Naturals de Barcelona (MCNB); **a** holotype of *Montsecosuchus depereti* Vidal, 1915; **b** holotype of *Montsechobatrachus gaudryi* Vidal, 1902; **c** Fishes of the group Actinopterygii Klein, 1885; **d** molar of *Deinotherium giganteum* (Kaup, 1850). Graphic scale: 2cm.

Fig. 5. Selection of palaeontological material of the Museu de Ciències Naturals de Barcelona (MCNB) prepared at laboratories; **a** rock, block and thin section to study with binoculars and a microscope; **b** sieved sample, all its components are foraminifera of genus *Nummulites*. Graphic scale: 2cm.