TYPES OF PALEONTOLOGICAL COLLECTIONS, INTEREST: THE CASE OF THE MUSEO NACIONAL DE CIENCIAS NATURALES (MNCN), MADRID, SPAIN

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RESUMEN

La división y ordenación de las colecciones paleontológicas puede ser realizada de diferentes maneras, de acuerdo a su origen y trayectoria, y valor científico. En este trabajo se analiza esta tipología y su interés dentro de las colecciones del M.N.C.N.

ABSTRACT

Palaeontological collections may be divided into different types according to their origin and their scientific value. This typology, and its applications insofar as the palaeontological holdings of M.N.C.N. are concerned are analyzed.

TYPOLOGY OF THE COLLECTIONS

A palaeontological collection may be organized according to multiple criteria, although normally taxonomic criteria are present. Therefore, in most institutions the staff responsible for the collections usually try to divide them into three large groups: invertebrates, vertebrates and plants. However, sometimes institutions may choose to vary, or even discard these divisions because of certain overriding factors.

One of these factors may be the importance and scientific prestige of the collector or person who donated the collection. Another factor is the interest, qualitative as well as quantitative, of the material in the collection. For these reasons we may choose not to organize the material according to taxonomic and/or stratigraphic criteria, but to maintain instead the specimens in the so-called *author's collection* grouping. In this case the collection receives the name of the author who built it up. Several well-known museums have grown up around such collections, including the P. Franco Dávila collection at the Museo Nacional de Ciencias Naturales of Madrid (Calatayud, 1986, 1988a,b), and the H. Sloane collection at The Natural History Museum (Whitehead, 1970). Indeed, in some cases these author collections have been the source of their museums' splendour, (Osborn collection at the American Museum of Natural History).

To a lesser degree we also consider as author's collections the monographic collections (family, genus, site, and others) that were formed by an individual over years of research and provide the basis for their publications. An example of the latter is the Gómez Llueca collection collected in the 1920s and consisting mainly of macroforaminifera from tertiary outcrops in Spain, and outcrops in southwestern France. Another is the Menéndez Amor collection which consist primarily of miocene angiosperms collected during the 1940s from Pyrenean sites in Lerida (Spain). Both of these collections are currently deposited in the M.N.C.N.

Sometimes the category or the scientific status of specimens will be the decisive factor for making a *reference collection*. These include type specimens, and specimens considered as figured and cited, for instance the palaeontological invertebrate and plant collections of the M.N.C.N. The size of these collections reflects the category of a museum and the importance of it's holdings.

This collection should be adequately protected, as much against environmental dangers, as against theft, inappropiate handling or over-handling (Sterrenburg, 1990; Owen, 1977). Therefore the reference collection should be separated from the collection as a whole (Owen, 1964; Brunton, 1979). This occurs in the M.N.C.N. with the collections cited above. The following considerations are taken into account with these collections:

i) Restricted access, for research purposes only, with supervised handling of specimens.

ii) The possibility of including a documentation dossier with each specimen.

iii) The possibility of separating specimens for specific and continuous treatments and/or specimens which need particular environmental conditions to ensure their long term preservation.

iv) The possibility, in case of a disaster, of evacuating the material quickly and in a single operation. At the M.N.C.N. the fire-proof cabinets are fitted with sliding drawers which can be removed easily from cabinets to move the specimens to a safe area.

Aside from separating these collections from the main body of the collection, we must abide by the ICZN directive 72 b requiring each specimen to be marked clearly. At the M.N.C.N. the following distinctive marking are used: red: holotypes, lectotypes and neotypes; green: remaining types; and, yellow: figured and cited specimens (Diéguez & Montero, 1992).

The *historical collection* is comprised of specimens obtained from scientific expeditions or collecting campaigns that were significant in the course of science, and of specimens that form part of the history of the museum. These interests can also include the collector and/or the collecting circumstances. Some specimens have only historic value, having lost their scientific value due to poor or missing provenance data. Other collections have both historic and scientific value. This is the case of the Diatom collection of E. Caballero Bellido, which, furthermore, is considered an author's collection, and consists of instruments (most of them invented by himself), microscopic slides, cleaned material for future preparations, and documentary material (microphotographs, laboratory notebooks, notes, and so on).

Another example of the historic material is the Edentata material, and, in particular, the specimen of *Megatherium americanum* Cuvier which is exhibited in the M.N.C.N. This specimen was discovered in 1788 by a Spanish monk on the banks of the Lujan River in the southwest of Buenos Aires, Argentina, in what was then the viceroyalty of La Plata. It was sent by the Viceroy following royal recommendations about stocks of natural history specimens destined for this museum (Lemoine, 1961), and was mounted, described, and drawn in the museum. The drawings and descriptions were sent to Cuvier, who gave it a binomial name, described it, and published it.

The *special collections* are formed by duplicate material or by material without provenance. This material can be used for different purposes: to form a collection that can be consulted by the general public (nonresearchers) who need to see palaeontological specimens for comparative purposes. Specimens can also be loaned

to educational centers, where they may be used to introduce the public to an understanding of taxonomy. Other uses include hands-on experience for blind people, or allowing children to learn to prepare specimens (Paget, 1978). Also, the so-called "Discovery Rooms", that are widespread in American museums (Downing, 1962; Arth & Claremon, 1977), are now starting at the M.N.C.N.

These different experiences confirm the idea that the utility and interest of a palaeontological collection are multiple, and not exclusively scientific or didactic.

INTEREST OF THE PALAEONTOLOGICAL COLLECTIONS

The importance and interest which a palaeontological collection may have vary and are related to its scientific value, its state of preservation, and the quality of documentation. Based on this, we may consider the following kinds of interest:

1) Scientific interest

The taxonomic collections of a museum should be conserved and increased since they form the basis for systematic, environmental, ecological, and evolutionary studies (Funk, 1989; Danks,1991).

Apart from these reasons, which serve for all types of natural history specimens, palaeontological collections provide the basis for studies of micro and macroevolution, as well as palaeogeographic and palaeoenvironmental studies.

Knell & Taylor (1989) indicated that the interest of a collection depends on the quality of the specimens and the documentation which they have acquired since their incorporation. Nevertheless, we believe that this definition is imcomplete, since it is also important to consider the degree of conservation of the specimens, which should permit any kind of preparation technique for their study. A good maintenance of the specimens would limit pollution and damage to them.

Another important measure of the value of collection is the status of specimens. Study by specialists adds to the scientific-taxonomic documentation of specimens and increases their value for future studies. From this point of view, specimens belonging to a typical series would be of greatest importance, while those that could be included in the following categories are of lesser value:

i) Specimens of organisms which because of their habitat or anatomical structures are only fossilized rarely and/or only under special conditions (for example, Miocene bird's eggs fossilized in gypsum, currently deposited in M.N.C.N.).

ii) Figured specimens or those which served as the base for research.

iii) Specimens from sites that have been exhausted by excessive exploitation, or from commercial mines and quarries that are non-existent today. A good example is the site of Libros (Teruel), where sulphur marl beds produce an excellent miocene fauna of amphibians (Anura), reptiles (Colubridae), and birds (Anatidae), among others, all of which are well-represented in the M.N.C.N.

iv) Specimens from sites where access is difficult because of unfavorable geographic or political situations, as is the case of the Isla Cabrera (Islas Baleares), where outcrops were under military control following World War I until the islands were declared a national park, and therefore have limited access.

v) Specimens of organisms with a limited record in the beds, due to a reduced geographic or stratigraphic distribution (exceptional sites).

2) Patrimonial-historical interest

The importance that fossil specimens have from a patrimonial-historical point of view is supported by law in Spain. Under the law, all objects of palaeontological interest are considered as part of the historical heritage, and they are consequently referred to under the Patrimony Law (Law 16, 25/6, 1985; Preliminary title, First article).

Therefore, much of the importance of a palaeontological collection can be attributed not only to its material characteristics but also, in large part, to its origin (historical expeditions, outcrops that are protected or to be protected, etc). As such, material from well-known classical sites throughout the world will have important patrimonial value. These sites generally have several of the following characteristics: i) they produce specimens with an excellent state of preservation; ii) they produce unique organisms; iii) they define a stratigraphic stage; iv) the site is no longer accessible due to its location (e.g., on road slopes, or near built-up areas) or imminent disappearance. For example, at the M.N.C.N. there are specimens of Ordovician graptolites from a site which, in the 1940´s, was on the outskirts of Cáceres (Spain) and today is no longer accessible, having been absorbed by the town.

3) Didactic-exhibition interest

This kind of interest results from the excellent preservation of the specimens' morphological and anatomical structures, the level of the interpretive information, and the impact that the specimen will have for attracting the attention of the public. These specimens can serve as a focus for any type of display (posters, showcases, and so on), or as an inducement to attract the attention of the people towards the museum. There are also high-quality replicas of specimens with these characteristics. For example, the classic replica of a whole specimen of *Diplodocus carnegiei* Hatcher that is displayed in several museums in the world, is also exhibited in the permanent Palaeontology Exhibition Room of the M.N.C.N.

However, for special didactic purposes, such as illustrating specific ideas, such as the idea of ordinary fossils, where bad preservation is the norm, specimens with clear deformations, unclear structures, or breakages can also be used. This idea is not widespread because showy specimens are usually exhibited. Moreover, we need to explain fully the significance of the specimens and why we are exhibiting broken, deformed, eroded or bioeroded specimens. These kinds of fossil remains are very common for the palaeontologist, who knows and understands their meaning, but not for the amateur or the public. Accordingly, some collecting is being planned and will be carried out by this museum in the near future.

4) Economic interest

The economic interest is mainly limited to commercial transactions outside of the museum. Being a keeper of the national patrimony, the sale of collection material is rejected. Economic considerations, even between museums, are limited to the sale of replicas and photographic material (sets of slides, posters, post cards, and so on).

Moreover, it must be considered that a museum´s obligation is to promote natural history as a hobby to people, and to raise their awareness of the natural world. This

practice can have the negative aspect of providing information to people about the location of fossil sites, their level of productivity, collecting methods for better extraction, fossil value, appropriate transport, storage, and so on. All this can help unscrupulous collectors and merchants to plan extensive collecting campaigns that will exhaust the sites. Reports of this spoilage, which is very difficult to combat, often appear in the newspapers and is a cause of concern of naturalists, and professional and state agencies that must protect important sites (Duff, 1979a,b; 1987; Besterman, 1988; Cope, 1988; Black, 1988; Taylor, 1988; Wood, 1988; Rolfe et al, 1988; Clemens, 1988; Wild, 1988; Ferguson, 1988). In Spain, it is usually local governments which pass laws to protect sites, but, occasionally, private companies help. For example, since 1975 IBERDUERO S.A. has collaborated with the Rioja local government to protect sites of dinosaur tracks in that area.

The M.N.C.N. is collaborating with the Madrid local government to produce a catalogue of sites that should be protected, and to which only researchers should have access.

Sometimes there is an economic interest for museums in using spectacular specimens for non-scientific aims, such as advertising. In 1987, an advertising company tried to use the replica of the *Diplodocus* in the M.N.C.N. in a film for a publicity campaign about the state railway company (RENFE), but the idea was discarded for technical reasons.

CONCLUSIONS

Palaeontological material does not have to be grouped exclusively according to taxonomic criteria because, in specific cases, there are other criteria which take precedence (historic, scientific, didactic).

Accordingly, it is possible to focus in a non-taxonomic way on some collections which, until now, have been studied only from a zoological or botanical point of view.

The retrieval of old collections, and the implementation of research focused on exhibition and didactic aspects (by the study of necessary material resources, as well as how to reach a given sector of the public in a certain way) fulfills this task.

In summary, interest in palaeontological specimens can come from many different areas. Although taxonomic interest continues to be the most important, it is not the sole interest, and when we widen the scope of possibilities for study, we increase the utility and the value of the collection.

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